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Proceedings of the Annual and Semi-annual Conventions

National Electric Light Association New England Section

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PROCEEDINGS

OF

THE FIRST ANNUAL

AND

THE FIRST SEMI-ANNUAL

CONVENTIONS

OF

The New England Section

OF

The National

Electric Light Association

1909-1910

THE

FIRST ANNUAL CONVENTION

PROCEEDINGS

OF

The New England Section

OF

The National

Electric Light Association

AMERICAN HOUSE
BOSTON, MASS.

March 16 and 17, 1910

[illegible]

[illegible]

[illegible]

Officers for 1910-1911

Alex. J. Campbell, President, New London, Conn.
Howard T. Sands, Vice President, Malden, Mass.
L. D. Gibbs, Secretary-Treasurer, Boston, Mass.
Miss O. A. Bursiel, Assistant Secretary, Boston, Mass.

Executive Committee

J. A. Fleet, Portland, Maine.
J. S. Whitaker, Portsmouth, N. H.
A. B. Lisle, Providence, R. I.
R. W. Rollins, Hartford, Conn.
F. H. Parker, Burlington, Vt.
Chas. H. Hodskinson, Boston, Mass.
S. Fred Smith, (Ex-officio) Salem, Mass.

Committee on Membership

Maine

Jas. A. Fleet, Consolidated Elec. Lt. Co. of Maine, Portland, Chairman.
A. S. Bosworth, Brunswick Elec. Lt. & Pr. Co., Brunswick.
W. S. Wyman, Central Maine Power Co., Waterville.

New Hampshire.

J. S. Whitaker, Rockingham County Lt. & Pr. Co., Portsmouth, Chairman.
W. G. Meloon, Twin State Gas & Elec. Co., Dover.
S. P. Hunt, Manchester Traction, Lt. & Pr. Co., Manchester.

Vermont.

F. H. Parker, Burlington Lt. & Pr. Co., Burlington, Chairman.
E. E. Gage, St. Johnsbury Electric Co., St. Johnsbury.
L. J. Royce, The Fall Mt. Elec. Lt. & Pr. Co., Bellows Falls.

Massachusetts.

C. H. Hodskinson, Edison Electric Ill. Co. of Boston, Chairman.
E. P. Rowell, Plymouth Electric Light Co., Plymouth.
W. A. Whittlesey, Pittsfield Electric Co., Pittsfield.

Rhode Island.

A. B. Lisle, Narragansett Elec. Ltg. Co., Providence, Chairman.

E. P. Gosling, Newport & Fall River St. Ry. Co., Newport.

Wm. McGregor, Pawtucket Electric Co., Pawtucket.

Connecticut.

R. W. Rollins, The Hartford Elec. Lt. Co., Hartford, Chairman.

F. D. Adams, The United Illuminating Co., New Haven.

C. E. Smith, Torrington Electric Lt. Co., Torrington.

Thomas Davenport Celebration Committee

E. D. Blackwell, Mgr. & Supt., Neshobe Elec. Co., Brandon, Vt., Chairman.

W. G. Meloon, Gen. Mgr., Twin State Gas & Elec. Co., Dover, N. H.

F. D. Gordon, Supt., Lewiston & Auburn Elec. Lt. Co., Auburn, Me.

Committee on Statistics and Information

R. W. Rollins, Gen. Mgr., Hartford Electric Lt. Co., Hartford, Conn., Chairman.

Alfred F. Townsend, Mgr., Woonsocket Elec. Mch. & Pr. Co., Woonsocket, R. I.

G. L. Sadler, Supt., Nashua Lt., Ht. & Pr. Co., Nashua, N. H.

Committee on Entertainment—Summer Convention

Wm. M. Lewis, Mgr., Rockville Gas & Elec. Co., Rockville, Conn., Chairman.

Frank S. Price, Pettingell-Andrews Co., Boston, Mass.

E. R. Davenport, Narragansett Elec. Ltg. Co., Providence, R. I.

Master of Transportation

C. H. Hodskinson, 70 State St., Boston, Mass.

New England Section of the National Electric Light Association

The first annual convention of the New England Section of the National Electric Light Association was held at the American House, Boston, on Wednesday, March 16, and Thursday, March 17, 1910, under the presidency of Mr. S. Fred. Smith of Salem. The convention was called to order by the President on Wednesday, March 16, at 1 P. M. In opening the meeting the President said:—

PRESIDENT SMITH.

Gentlemen, the time having arrived for which this meeting was called, you will please come to order.

We have a large attendance here today, which is gratifying to all of us, and I hope you will all be able to remain throughout the whole afternoon, and, indeed, throughout the entire convention; and in the intermissions between the meetings I hope you will associate together and get all the advantages you possibly can out of this convention, both in a social and business way.

The first business in order will be the reading of the record of the previous meeting, held at Newcastle, in September, 1909.

(On motion, the reading of the minutes was dispensed with, the President saying that inasmuch as the proceedings had been printed and distributed the members are aware of the entire proceedings and it will not be necessary to consume time in reading.)

The President. The next business will be the reading of the President's address.

THE PRESIDENT'S ADDRESS.

Fellow Members and Guests:—

It is with the utmost pleasure and gratification that I stand before you this day to welcome you all to the First Annual Convention of the New England Section of the N. E. L. A., and I esteem it a great honor and privilege to address such a large representation of the electric lighting interests of New England.

It was hardly more than one year ago that the idea of forming this Association was brought to the attention of the central station interests at a meeting held at the Algonquin Club in Boston, at which meeting your present officers were elected and it was than that we all received the inspiration of the promoters of this New England Section.

Much has been accomplished in this short period of time in forming an Association of unbounded value to the industry which we represent.

I believe we have established a record for growth in membership in New England, and perhaps in this country, far ahead of any similar organization and no other geographic or state section of the N. E. L. A. is "within speaking distance" of us in this respect. When it is realized that there is only a limited membership available in each community, our growth demonstrates plainly, that our Association was needed, for the opportunity to join has been readily taken advantage of. I do not believe, however, we have commenced to reach the limit of membership that we shall finally obtain, for as our industry grows and as our prestige is more readily felt and recognized throughout our Section, more of the electric lighting companies, as well as their employees, will become members and I hope to find that before very long it will be an exception for any Company or employee who holds the position in the community that it should, not to be a member of our Association, ready to receive and give all the advantages of co-operation.

Our membership today, covering the six New England States, is composed of 107 Class A., 368 Class B., none Class C., 33 Class D., 56 Class E. members, making a total of 564 members at the date of this meeting. I can safely say without fear of contradiction, that not one of the representatives present at the initial meeting had any conception of the extent to which this Association will eventually grow. In fact, where else than right here in New England could such a phenomenal growth be obtained? The wisdom and foresight of the management of the N. E. L. A., in conceiving the idea of sectional associations and individual membership has been clearly demonstrated. The growth in interest and membership was equally apparent both before and after our summer meeting, held at Hotel Wentworth, in September of last year, and which your President referred to as a most interesting and important point in the history of our organization. Much of our future depended upon that first meeting, for success or failure was then to be determined. But the attendance and enthusiasm displayed at that meeting clearly defined the success of the organization and the approval of the plans laid down by your officers and committees. We must not lose sight of the fact, however, that much greater progress has been made in the development of our present Association than otherwise might have been the case, had it not been for our inheritance of other organizations of similar character, which associations commenced their careers under less favorable conditions and without the fostering influence of an organization of wonderful ability and resource. I refer particularly to the Association of Electric Lighting Engineers of New England and to the Vermont Electrical Association. Both of these associations were doing most excellent work in their respective fields. I regret, however, our inability to admit to membership those members of these associations who represent municipal ownership. The advantages of having one large, successful association rather than several smaller ones will eventually be proved, for necessity of combination is as true in association work as it is in the business represented by us.

The periodical abolishment of entrance fees by the N. E. L. A., for admission to Class B. membership, has materially aided us to increase our membership and I am thoroughly impressed with this liberal policy which I hope may be continued as far as practicable without inflicting hardship upon the National Association. I look for material increase in membership as long as this system prevails.

Notwithstanding we are subsidiary to the National Association and owe much to their prestige in accomplishing the position we hold today in the electric lighting field, it must, nevertheless, be borne in mind that we are an important integral part of that organization and in so far as they enjoy the confidence of the public and the prosperity of the industry, just so much do we also maintain a position of importance in this territory and we will benefit by their success. And further, not the least important member in the smallest plant need feel but what his connection with this Association is as necessary and important to complete the chain of usefulness to which this Association lends itself, as is the highest and most important official of our largest corporations. Each and every one of us has his duty to perform and he must take on that degree of usefulness and responsibility that his position requires. This Association is bound together by just those ties of loyalty to one another that eventually stir within us that courageous feeling of sympathy for and offer of assistance to those less familiar with the problems of the art of manufacture, distribution and sale of electricity. Don't let any of us assume that our neighbor is not the equal of ourselves, merely because it is his fortune not to belong to as large a corporation or because his field of operation is not as large as our own. Such relations build barriers that are hard to surmount and work mischief with the principles of good fellowship and friendship, all of which are really the important underlying principles upon which our Association is founded. Let us all, therefore, during these conventions, and at all other times, extend to our neighbor that right hand of fellowship that will make us all feel the importance of our own position and the conviction that ours is the *best* association and that our industry is the equal of any.

At the Annual Meeting of the N. E. L. A., at Atlantic City, in June, 1909, resolutions were passed, making the presidents of the state or geographic sections, members of the Executive Committee of the N. E. L. A. Your President has attended all of the National Association Executive Committee Meetings that have been held since that time and has given such of his time and efforts as have been required. Very many interesting and important matters have been transacted at these meetings and the representation on that committee of a member from your Association has demonstrated to that body the importance of these geographic sections and of the New England Section in particular; our Association being by far the largest sub-division of the N. E. L. A. One of the most important matters from this district to be considered was that of income. Agreeable to invitation from the N. E. L. A., your President along with the President of the Pennsylvania Section and a representative of the New Hampshire Section, met in New York, in October last, to consider this subject. The matter was presented in the strongest manner possible favorable to our Section and arguments made for a material increase in our income. The matter was finally referred to the Finance Committee of the National Association, their report not having yet been made to the Executive Committee. I am sure the N. E. L. A. now more fully realizes the importance of financing our sectional association's requirements, and it is my belief that much greater assistance will be given us in the future, though in our ambition to increase our income we must not impose a burden upon the National Association, for they also have many demands of their own. The treatment accorded to our New

England Section by the officers of the N. E. L. A. has been most considerate for our welfare and the most cordial relations exist between the two associations. The funds of your Association have been expended in a careful manner and only those expenses have been incurred as were required for the proper carrying on of this Association's work. Your Treasurer has made up a statement of income and expense and will make this report to you later, in detail.

On account of the quantity of detail necessary in the formation of our organization and the attendant increase of work incident to our growth, it became necessary for your Secretary-Treasurer, Mr. Chas. H. Hodskinson, to relinquish some of the duties of his office, and this work has been taken over and handled in a most efficient manner by Mr. L. D. Gibbs, also of the Boston Edison Co. Our organization has now reached such large proportions that it is impossible to carry on this work without some paid assistants. In fact it has been necessary to employ the services of a stenographer to assist in this work. This is the only expense for administration as none of its officers have thus far received any salary whatever, though much time and expense have been contributed for the Association's benefit. Such loyalty deserves recognition and I know it will be highly appreciated by all of our members.

It has apparently been thought wise to carry out the plan outlined in your President's remarks at the previous convention, to hold two conventions each year and this annual convention will be devoted more generally to matters pertaining to the welfare and advancement of our industry than to social and experience relations, all of which, however, are necessary for the proper fulfillment of the scope of our Association. Your President is highly appreciative of the many courtesies that have been extended to him by the officers and members of this Association and wishes to acknowledge before you that the success of the conventions and the carrying on of the work of this Association is due solely to the loyal support and energetic work of these members. Too much cannot be said or written of their work in your behalf. I wish especially to express my appreciation for the services performed, and assistance rendered to me by the Secretary-Treasurer, Mr. Hodskinson, and Assistant, Mr. Gibbs, who have each been most proficient in every detail. My appreciation on the part of this Association, is extended to those central station companies who have so liberally contributed to the entertainment and welfare of our Association, particularly the Edison Electric Illuminating Co. of Boston, the Narragansett Electric Lighting Company of Providence, R. I., the Rockingham County Light and Power Company of Portsmouth, N. H., and many others, also to those manufacturing companies, central stations and individuals who so liberally subscribed their funds for our use in carrying on our work, without which, our conventions could not have taken on the character of purpose which the administration desired. I foresee for your new officers whom you are to elect at this convention a most promising future and I bespeak for them the same courteous treatment and continuation of loyalty that have been accorded to the present administration. Your hearty co-operation is necessary for their success.

The thanks of this Association are due to the technical press for the very many favors which have been extended to us and for the courtesy shown by their local representatives.

Your President is in full accord with the movement just started in Boston by representatives of allied associations to consider the subject of the erection of a building or home for the use and occupancy of scientific and engineering societies. This it seems to me is a most desirable undertaking that deserves intelligent consideration, and I hope that their expectations may be realized. This matter I hope will receive your favorable consideration.

The tendency of our operating companies to consolidate and thereby become more efficient in serving the public in their respective localities, in no wise depreciates the position held by this Association, but on the contrary makes it more imperative than ever for the individual member to emerge from that condition of semi-usefulness and by his own energy and his association with others become more valuable and more prepared to meet these new conditions.

It is well to observe at this time that no material increase in municipal ownership of public service utilities has taken place during the past year and with the determination on the part of the corporations to treat fairly the municipalities and the public and to educate the public to higher ideas of appreciation of what is really being done, I see no immediate need of fear on the part of those companies whose intentions are based on these principles. It becomes, therefore, one of the duties of this Association to carry out such educational ideas as will benefit not only our central station interests, but also the public as well.

Mr. Hodskinson. (Secretary). Gentlemen, you have heard the interesting and enlightening report of your President. What is your pleasure to do with it?

(On motion, the report was accepted and ordered spread on the minutes, by unanimous vote.)

The President. The next business is the report of the Secretary and Treasurer.

REPORT OF THE SECRETARY-TREASURER,

C. H. Hodskinson.

Boston, Mass., March 16, 1910.

To the Members of the New England Section of the National Electric Light Association,

Gentlemen:

I beg to submit the following report for the year ended March 16, 1910:—

Receipts.

Amounts received from National Electric Light Association as follows:—

Aug. 12, 1909, Refund on 168 Class B and Class E members	$420 00
Sept. 8, 1909, Refund on 9 Class B and Class E members	22 50
March 1, 1910, Refund on 178 Class B and Class E members	445 00
March 11, 1910, Refund on 5 Class B and Class E members	12 50
Amounts received from contributions . .	542 50
Interest on bank deposits	2 63
Total	$1,445 13

Expenditures.

As per receipted vouchers	$926 47
Balance of Cash on hand March 16, 1910 . .	$518 66

Bills Payable.

None except those incurred for this meeting.

Accounts Receivable.

Refund due from National Electric Light Association for 1 Class B. Member, $2.50. (His dues for 1909 have not been paid to National Electric Light Association).

Membership—January 1, 1909.

Class A	81
Class B	173
Class D	15
Class E	10
Total	279

MEMBERSHIP—JANUARY 1, 1910.

Class A	104
Class B	362
Class D	32
Class E	55
Total	553

MEMBERSHIP—MARCH 16, 1910.

Class A	107
Class B	368
Class D	33
Class E	56
Total	564

Respectfully submitted,

C. H. HODSKINSON,
Secretary-Treasurer.

(On motion, the report of the Secretary and Treasurer was accepted and placed on file.)

(On motion of Mr. Hodskinson, Secretary, the meeting ordered the appointment by the Chair of a committee of three to audit the Secretary's accounts. The President appointed as the auditing committee, Messrs. Welles Holmes of Cambridge, Frank S. Price of Boston, and H. H. Fairbanks of Worcester.)

THE PRESIDENT. Are there reports of any special committees?

The next matter of business is the reading of the papers; but before that takes place, it is essential that we know how many members present will accept the invitation extended by the Edison Electric Illuminating Company to inspect their L Street plant at four o'clock this afternoon. I wish, therefore, that all members who intend to go will please raise their hands, so that we may count them and make our arrangements accordingly.

(Practically everyone in the hall raised his hand, or stood, and was counted.)

THE PRESIDENT. All right, gentlemen.

In accordance with the By-laws, it is necessary that the President, with the approval of the Executive Committee, shall nominate a committee to present a list of officers for the ensuing year. I will therefore nominate as members of that Committee the following gentlemen: Messrs. George R. Stetson of New Bedford, Thomas Hawken of Rockland, Me., L. J. Chase of Concord, N. H., C. C. Wells of Middlebury, Vt., and Fred D. Adams of New Haven, Conn. Will those gentlemen convene and make their report at the afternoon meeting tomorrow.

I know, gentlemen, that inasmuch as we have with us today an officer of the National Electric Light Association, who takes a great deal of interest in the different geographic sections, as well as being a power in the affairs of the National Electric Light Association, and to whom we are indebted for a great many favors, you will all be pleased to hear a few remarks from him. It gives me great pleasure, therefore, to introduce to you Mr. T. Commerford Martin of New York, Secretary of the National Electric Light Association. (Applause.)

MR. THOMAS COMMERFORD MARTIN.

Members of the New England Section and Fellow-Members of the National Electric Light Association, for we are one:—I have great pleasure in being here today at the invitation of your worthy President, to see on behalf of the National Executive what progress is being made in the New England Section and to go back, as I did the last time I attended your convention, with a great many ideas and suggestions as to future work throughout the country, and with a great deal of encouragement as to the future of both bodies. I attended your meeting at Newcastle, last fall, when you were in a more or less formative state; and I think that the progress which has been made in the intervening period justifies the step which has been taken in creating this Association.

A little play was given in New York, not long ago, called "Robinson Crusoe," by some of the school children of the public schools. Robinson Crusoe came upon the stage and brought with him his good man, Friday, and sundry trophies of his marvelous adventure, whereupon Mrs. Crusoe went to the side wings and brought in a long string of children and said, "My dear husband, I, also, have not been idle while you have been away." (Loud laughter).

And this reminds me of another story, perhaps more or less apt to the occasion. A distinguished minister in New York, who is very fond of bestowing consolation and comfort upon his parishioners, addressing his congregation one Sunday morning, said: "An old and distinguished financier, whose name I shall not mention, called upon me yesterday in great distress and discouragement. We conversed together, and I tried to administer encouragement and to do our friend and brother whatever service I could, and today, that man is not only a cheerful Christian, but a happy husband and father." Whereupon a young lady in one of the pews turned around to the matron who sat next to her, and exclaimed, "My, but wasn't that sudden." (Laughter.)

I felt as I listened to the figures which Mr. Smith and Mr. Hodskinson gave of your growth that you have also been very busy in the interval, and I felt as I listened to them that if I had not been able to present figures of equal development I should have been somewhat ashamed.

The New England Section, I believe, justifies the praise of Mr. Smith, that in its growth it equals, or has equalled during the last six months, any of the technical and engineering bodies that we have in this country, if not in the world. It certainly is true of the National Electric Light Association, and an acknowledged fact, that at the time of the Newcastle meeting we had a membership of about thirty-two hundred. According to the figures which I have with me and which I have had the pleasure of showing Mr. Smith, we have close on to forty-eight hundred members today, making a growth of about sixteen hundred in five months. No engineering society of national character has ever had a growth like that, either in this country or in any other country; and I think from such figures, that the growth of this Section and that of the National body show we really ought to feel that at last the central station industry of the country is beginning to enter into its legitimate place, as to the dignity that it has in the eyes of the public and the influence that it wields in forming and shaping public opinion and in the protection of the interests for which our Association stands.

It is my mission as Secretary of the National Association to preach the doctrine of getting together, getting acquainted, standing shoulder to shoulder. One of the things which we regard as a heresy is the principle of the isolated plant. Now, it seems to me that a central station man who simply is satisfied with being a squatter in his own town and his own plant, and does not join hands with his fellow workers in the same industry in the state in which he lives, is simply putting himself into the category of the isolated plant. He is supporting a doctrine which is subversive of any industry for which he stands, and therefore I have to preach the doctrine of getting in your state associations. Your local body is not an effective association unless it joins hands with other state associations. Unless it does so, such an association is in itself an isolated plant. The state association cannot exercise the influence or do the good that it should do while it stands apart and alone; nor can the National Association do the work for which it has been created unless it enjoys the support and affiliation of the various state associations throughout the country.

It has been a great help to the Executive of the National Association to be able to point to the brilliant example of the New England Section of the National Association, as to what can be done in work, in influence and in growth. I am very glad to be able to state that since I attended your meeting last September at Newcastle I have had opportunities of addressing various state bodies throughout the country, so that at the present time steps are being taken along the New England line for organization in such states as Wisconsin, Nebraska and Michigan, where state organizations are under formation; and state organizations are proposed in such states as Georgia, Virginia, West Virginia, North and South Carolina. While on both sides of the border we have suggestions and propositions which, if carried through, will make the old National Electric Light Association, which this year celebrates its twenty-fifth anniversary, an international body, a body extending its influence throughout the whole of the North American continent, and extending its influence also to Europe and the far East.

Gentlemen, we are citizens of no mean country. We represent an interest which touches the public at more quarters and at more angles of incidence than almost any other industry which ever existed in the world, and it is only by getting together, by such meetings as this, and by such associations as we have formed and are promoting, that the central station can best and fullest achieve its destiny; and I desire to congratulate your officers and yourselves on being here, and upon being members of such bodies. (Loud applause.)

THE PRESIDENT. Gentlemen, certainly the remarks made by Mr. Martin are very true and they will stimulate us all in giving additional loyalty and push to our organization in the future, such as has been given in the past, and I hope that the position which our Association now holds can be maintained, for we have made a good start, and with the energy and efficiency of our own members and the interest and help of our friends, I know that the New England Section of the N. E. L. A. will continue to lead every other section for a long while to come.

I have just a few more matters I want to speak of before we start in on the program for this session. The first thing I want to refer to is, that it has been called to my attention that one-eighth of the membership of the National Association is located right here in New England. That is surely a wonderful showing, that we should have such a large proportion of the membership of this Association right among ourselves.

In order to realize the full value to be derived from this convention I suggested the idea of asking those members who have questions to ask to present them before the meeting, in order that they may be answered during the session, and I have asked Mr. Alex. J. Campbell of New London, if he would kindly act as a committee to take care of any questions that may be asked and see that such questions are answered at the meeting tomorrow afternoon.

I hope, and I think, there is no doubt, that we may have some questions that will be of interest not only to the interrogators, but also to other members who are assembled here. So that if any member has any new business or any question that he would like to ask he need not hesitate to present it, and I wish he would present it at the end of this meeting.

I would request those members present who wish to take part in the discussion of any of the several papers that will be read tomorrow, to please hand their names to me as early as possible, so that no one may be overlooked. We want to give these matters all the attention we can, and if anyone has any special questions he desires to ask and to enter into discussion, I hope he will ask them freely.

There is one matter more. It is in regard to the tickets for the banquet tomorrow evening. We must know right away how many members will be present at the banquet. You will perceive the necessity of our knowing how many are going to be there, so that ample provision may be made for everyone. Please do not forget to notify the attendant in our registration room, so that adequate and timely provision may be made for you all.

I presume there are some gentlemen present who are not now members of our Association. I hope that every one of them will join, so that our number may be increased. Application blanks may be obtained in the registration room.

In taking part in these discussions will the gentlemen please give their names and the names of the companies to which they belong, when they arise to speak, so that our stenographer may have a correct and complete schedule of the names of persons entering the discussion with their remarks.

Another important thing. Your remarks will be taken down by the stenographer and will be sent to you shortly for your examination and correction, and we ask that you will please return the reports to him promptly, so that he may aid the committee in the printing of the proceedings.

No more important subject, I daresay, will be presented at this convention than the excellent paper on the attitude of central stations toward electric automobiles which we shall have the pleasure to listen to, as it is to be read by its author, Mr. Hutchings. Very much thought has been given to this subject. It is one that every central station manager, at least, must be interested in. I hope that you will give your attention to the paper and discuss it freely. As Mr. Hutchings is present I will call upon him. It gives me great pleasure, gentlemen, to introduce to you now, Mr. James T. Hutchings, General Manager of the Rochester Railway & Light Company, Rochester, N. Y. (Applause.)

MR. HUTCHINGS. Fellow Members: It is with a good deal of timidity on my part that I venture to read this paper after the very excellent work which has been done largely by the Electric Vehicle and Central Station Association. I think we owe a great debt to that Association for the very comprehensive work they are doing. My paper is more or less an outline of what we are doing and what we intend to do, and the reasons for doing what we are trying to do in Rochester with the electric vehicle.

ATTITUDE OF CENTRAL STATIONS TOWARD ELECTRIC AUTOMOBILES

JAMES T. HUTCHINGS.

The important features in connection with the electric vehicle business are:—

1st. A good vehicle.

2nd. A battery suitable for the work which the vehicle is to perform.

3rd. The maintenance of mechanical detail of the vehicle to keep any friction at the lowest possible point.

4th. Attention to the battery to see that it is properly charged and maintained.

Each of these four points is equally important, and no one of them should be neglected.

Under the first heading: In the pleasure vehicle we are very fortunate in having at the disposal of our customers a very large number of extremely satisfactory equipments, and the customer can suit his own fancy as to selection, and he will be perfectly satisfied, so far as the vehicle is concerned, after he has made his purchase. In the case of the commercial vehicle, however, there is a slight tendency on the part of certain manufacturers to slight some of the mechanical details, feeling that it is not necessary to give the commercial vehicle the same close attention in regard to the elimination of friction as is given to the pleasure vehicle, while the contrary should be the rule. In the case of the commercial vehicle it is absolutely a question of dollars and cents in the moving of merchandise, while in the pleasure vehicle sentiment cuts a considerable figure. The less power required to operate the pleasure vehicle, the greater its field of usefulness and the lower the cost of maintenance, while with the commercial vehicle it is absolutely a question of the cost of doing the work which controls the situation.

In selecting a battery, care should be taken to see that the battery is suitable for the work required of the vehicle in question. The battery should be of sufficient capacity to complete the maximum day's work required of the vehicle without boosting, and no more; in other words, the battery should be empty on the maximum day, and on the average day at least three-quarters empty to get the best results. We have found in connection with some of our heavy trucking, where the mileage covered is low, that the standard heavy plate is giving excellent satisfaction, and the cost of maintenance is exceedingly low; whereas, in some of our delivery wagons, where it is advantageous to make from 60 to 65 miles per day if possible, it is necessary to use the thinnest possible plate in the lead type battery. The question as to what the Edison battery will do is one for the future, but at the present time there are only a few of us who are going to be able to get Edison batteries, as the capacity of the battery plant is more than sold out. This is not a point which interests us except in a very few cases where it is necessary to make exceptionally long hauls, as the range of vehicle activity is above 60 miles in the commercial wagons. Ninety-five per cent. of the work to be done in our cities and towns can be taken care of perfectly with the lead battery.

In order that the vehicle may do the work exacted of it, it is necessary that the mechanical state of the wagon be kept at a point of highest efficiency all the time. This is only possible by systematic and frequent inspection, lubrication, cleaning and relining where necessary. If we would have the wagons already in use give perfect satisfaction, we must insist on this inspection of the mechanical part of the vehicle, and on the maintenance of every moving part in the highest state of efficiency. We must insist that chains and bearings throughout be lubricated systematically and thoroughly, not only to save the wear and tear on the mechanical part of the vehicle, but to enable the user to get the maximum work out of it. An increase of 25 per cent. in the friction of the wagon will, in most cases, reduce the work of the vehicle more than 50 per cent. In this connection, it would be well for us to insist upon the owner having a complete record of when and how each working part was inspected and lubricated.

The battery is to the electric vehicle what the boiler is to the power house, and no matter how efficient the motor and mechanical equipment of the vehicle may be, we can get no more than the battery gives us. It is therefore vitally important that the battery receive the best possible attention. Where a very large number of vehicles are being taken care of in one garage, it is possible to go into all the refinements in charging and maintaining batteries. Most of us find at the present time that we are up against the maintaining of individual commercial vehicles where there are only from one to four outfits in a garage, and where we cannot afford to employ skilled labor for battery maintenance. In this connection we have found it a very considerable help to install a recording volt meter to show the voltage at which the battery itself was charging during the entire charge; then, by insisting on the maintenance of practically a constant charge rate, we have a permanent record which our inspectors can criticize, and which shows us pretty clearly whether the battery has been fully charged, overcharged, or under-charged. While we admit that this is not a scientific method, we have found it a most satisfactory one under the conditions outlined. If you were to tell a prospective customer for electric vehicles that it was necessary for him to have an expert battery man to take a record of his specific gravity every hour on each wagon, and to see that each cell in the battery was brought to uniform specific gravity and uniform voltage, taking cadmium readings between the positive and the negative plates, he would immediately say:—"This is an entirely impracticable and impossible proposition," and while we all admit that were we running a large garage on our own account all of these things would be possible and practicable, it is not necessary for successful operation under average conditions. I do not mean by this to discourage in any way the giving to the battery of the best attention possible wherever conditions will warrant it.

For the benefit of all of the members who may have had trouble with the Edison battery during the winter, due to low efficiency, I want to bring out our experience in the handling of one of these batteries, which would seem to show the necessity of having the battery very well closed in during the winter. In fact, to get the very best results, the battery should, as far as possible, be carried in a sort of fireless cooker. In other words, while in the cold the battery should be well enclosed so that the heat given off in the discharge of the battery will maintain the cells as near as possible from 70 to 80 degrees. In the machine in question which we were using, the battery was carried in an open tray, which was open for complete ventilation at the bottom and covered above with a metal hood, so that if the wagon was allowed to stand for twenty minutes in the open, the battery immediately came to the same temperature as the outside air. We found that by closing in the bottom of this rack with canvas and felt, so as to cut off the circulation of air, and insulating the metal hood with felt, so as to hold in the heat, this battery gave excellent satisfaction in the very coldest weather.

We find that with commercial vehicles, as a general proposition, unless the customer has more than five wagons, it is better for him to have these wagons charged in a public garage, where suitable attention will be given them, rather than try to charge them on his own premises. As soon, however, as the installation comes to a point where the customer can afford to maintain a good man on the job all night, just as good results can be obtained in his own private garage and at considerable less cost.

The rates for charging electric vehicles should be so arranged as to make it an object for the customer to charge his vehicle during the valley of the Central Station load. This we accomplish by the use of two meters in series, one of the meters being cut out by a clock operated switch during the preferential hours, all of the current being registered in the first meter and charged for at a uniform rate; while the current which is re-registered in the second meter during other than valley hours is charged for at an additional rate, our rate being four cents for the first meter, and three cents additional for the second, with suitable discounts for quantity. We have found in our work that the charging of our lead batteries at a comparatively low rate, allowing from eight to ten hours, is giving us a very much longer life of plates than the practice of charging the battery at the higher rate; also a very much higher efficiency in the battery. The battery should not be allowed to charge at such a rate as to bring the temperature of the electrolite higher than 100 degrees. However, if the vehicle is in a very cold garage, and you are unable to get the customer to heat this, it may be advisable for the first hour to charge at a higher rate, in order to heat up the cells, and then continue to charge at a lower rate to finish up. While the electric current is rather expensive for heating purposes, under these conditions it is very much better than charging at a low rate with very low temperatures.

Following is the average rate of consumption of current per mile of various class vehicles for the months of November, December, January, and February, which shows the additional current required to overcome the snow conditions existing in Western New York State:—

	Nov.	Dec.	Jan.	Feb.
Electric runabout......	.687	.733	.876	1.06
1,000 lb. delivery wagon.	.427	.494	.978	.666
2-ton delivery wagon....	.672	.722	1.044	1.288
3½-ton delivery wagon...	.894	.973	1.462	1.480

The snowfall for the months in question is as follows:—

November	1.7 in.
December	14.6 in.
January	22. in.
February	42.7 in.

I desire to take occasion at this time to call the attention of the members present to the use of the Sangamo ampere hour meter in connection with vehicles which are very heavily worked; that is, where there is a tendency to work the vehicle up to a point where it will frequently be necessary to tow it into the garage at night, or, where we are trying to do a little bit more than the wagon can accomplish. Under these conditions the use of the ampere hour meter will enable the operator, after a little experience, to get the absolute maximum out of his battery and still get into the garage without a tow, while without the ampere hour meter it will often times be very embarrassing under these conditions, especially if you are anxious to push this line of business. We have found these meters to be very satisfactory for this particular class of work. There may be others equally satisfactory; if so, they should be brought to the attention of the member companies.

Our Company now has in operation for its own work eleven electric trucks and eight electric runabouts, and we estimate that if we were to replace all of our horses with electric vehicles it would save in the operation, allowing 15 per cent. for interest and depreciation, 20 per cent. over the former cost of maintaining horse and wagon,—this estimate being based on a charge against the operation of electric trucks of our regular rates for current.

We have in Rochester a Vehicle Department in which there are at present employed eleven men, including the superintendent of the department, Mr. C. D. Hibler. In addition to maintaining our own wagons, we do repair work for any and all users of electric vehicles in our city, charging for this work a price which will show a fair profit; in fact, some of the repair shops are doing work at a considerably lower figure than that which we obtain. In addition to making repairs to vehicles and renewing the batteries, we cause a regular inspection of the vehicles of our customers to be made, to see that the batteries are properly charged and maintained and instruct the customer how he should treat his battery. This brandh of the work has very considerably increased our sales, keeping the vehicles at all times in operating condition. The following figures show how the sale of current for charging electric vehicle batteries has increased since 1906, when sales were $12,458 to $22,774 in 1909.

We handle, and are agents for the General Vehicle Company's wagons, the Exide battery, and Diamond rubber tires. Since last July we have purchased from the manufacturers 50 electric vehicles, and during last year the dealers in Rochester sold 120 electric pleasure vehicles.

I would particularly call to the attention of the members present the possibilities of the electric vehicle business as it may be carried on by the Central Stations, and if in your town or city there are at the present time, few, if any, live agents for electric vehicles, I believe the Central Station could take up this subject and push the sale with as much advantage as they have electric motors, care being taken at all times to be conservative and tell the absolute truth, so far as you know it, as to the results which may be obtained, so that the experience of the purchaser will be more pleasant than he anticipated.

For the benefit of the members present, I wish to call attention to the advantage the insurance companies are giving the electric vehicle over the gasoline car at the present time. I am informed that the only rate quoted for gasoline cars is $2.50 per hundred, while electric cars, housed in strictly electric garages, carry the same rate as the contents of the class of building in which they are housed, plus 25c. per hundred. In our own garage in Rochester, we are quoted a rate of $1 per hundred, while one of our delivery companies is getting a rate of $1.25—the difference being in the location and character of building in which the vehicles are stored. It is well known that the electric vehicle is allowed on the wharves of the City of New York, under the same conditions as a horse and wagon, while the gasoline truck is prohibited on account of the fire risk. I would suggest that the insurance expert of the National Electric Light Association take up with the Underwriters the matter of eliminating the 25c. extra charge for electric vehicles. I believe this can be obtained if the matter is properly pushed.

In closing, would say that we consider the sale of current for the charging of batteries for automobiles to be one of the most profitable sources of income to any lighting company. The electric vehicle as a commercial substitute for the horse and wagon is here to stay, and if it is not a success in any community it is the fault of the Central Station management of that community. Each and every Central Station can well afford to give this class of business the same attention that has previously been given to the motor business, and the writer believes that in less than five years it will be one of our principal sources of income.

THE PRESIDENT. Certainly Mr. Hutchings has given us a most excellent paper on this subject, and now we want equally as good a discussion. Before the discussion begins I want to state just one thing. We will be forced to close this meeting at four o'clock promptly, as the cars that are to convey the members to the L Street Station of the Edison Electric Illuminating Co. will be in readiness at 4.15 promptly. We must not delay a moment, because to do so would interfere with the railroad schedule. The cars will be at the corner of Portland and Hanover streets at 4.15. Let everyone be there.

In starting upon the discussion, I will be glad to hear from any member. I have the names of one or two that I will call upon. First, we would like to hear from Mr. H. T. Sands of Malden, if he is present.

Mr. Sands. Mr. President and Members: There is an old saying that "honest confession is good for the soul" and I feel somewhat prompted to 'fess up. I am prompted to do this from two motives,—partly because of the feeling that I ought to, and partly because of the gentlemen who happen to be sitting pretty near me. Some two years ago at a meeting held in this city, in which the question of the electric vehicle was discussed at some length, I took occasion to differ with the gentleman sitting just ahead, on account of his remarks on the attitude of the central station toward the electric vehicle. At that time I pointed out that the electric vehicle manufacturer was practically asking the central station man to urge his customers to buy blue sky, for the data which we were able to present to our customers regarding the operation of the electric vehicle was so thoroughly unreliable, so thoroughly based on theory rather than practice, that the central station man, having in mind the necessity of obtaining and retaining the good will of his customers, was loath to urge or advise the purchase of electric vehicles. We were promised at that meeting that that was one of the very purposes for which the electric vehicle manufacturers were getting together, and we were to have such information as was desired. I want to say that we have got it, and even more. We find today that the electric vehicle manufacturers can not only give us that data, but will back that data up with their written guarantee. So I want to confess that I was utterly in the wrong, and to acknowledge that the vehicle manufacturers have made good in that respect. I have, however, no apologies to make for what I said at that time. I think it was true.

When the question of having Mr. Hutchings come here and address us was considered, I did not know just what the title of his paper was to be. I had heard that Mr. Hutchings' company had secured something like twenty thousand odd dollars during the past year from the charging of electric vehicles, and that looked pretty good to me; and when I saw the subject of the paper itself I felt that it was most happily chosen. That really today is the crux of the whole situation; it is the attitude of the central stations towards the electric vehicle.

Now, what is the reason for the attitude which the average central station in New England today does have towards the electric vehicle? Are they wholly to blame for it? I doubt very much if there is another piece of electrical apparatus with which the average central station man in New England, aside from a few of our largest stations, is as little familiar with as the storage battery. We have had very little occasion to use it in the conduct of our business, and it has been looked upon as a peculiar and freaky piece of apparatus. The storage battery companies in the past few years have helped us out a great deal in that line in furnishing us with valuable information as to the character and performance of the battery.

Another reason is, I think, that we have been too prone to judge the performance of the electric vehicle by its performance of a few years ago. The early history of the electric vehicle is not a pleasant one to look back upon. Doubtless a great deal of the disaster which attended the use of the vehicle in the early days was due in a large measure to its misapplication, to the failure to properly understand the peculiar field to which the electric vehicle was adapted, and companies and concerns went ahead and used the electric vehicle where even the gasoline or horse-drawn vehicle would have been cheaper. Today we find electric vehicle manufacturers will not recommend the purchase of a machine to do work for which it is not adapted. That shows that another step has been gained.

Another thing, I think we have none of us given the care and the thought which Mr. Hutchings has pointed out to the mechanical up-keep of the cars. All of us operating gasoline cars know how carefully we operate them and look after the carburettors and keep everything keyed right up to the best possible condition. We have seemed to think that all that it was necessary to do to the electric vehicle was to squirt a little juice into the battery and that was all.

Before I sit down, I want to make another confession, and that is that the company with which I have been connected has been just as guilty as all the rest of us. Up to the present time we have not used any electrical vehicles in the conduct of our business. A short time ago I approached a large manufacturing concern, the treasurer of which was a friend of mine. An agent had informed me that he was contemplating the purchase of a truck, and I asked what he was going to buy, and he said what it was, giving the name of a gasoline vehicle. "For heaven's sake, you are not going to buy a gasoline machine, are you?" I asked. He pulled down the corner of his eye and said, "Sands, how many electric vehicles are you operating?" I might add, I have just purchased one electrical vehicle, and I feel very sure that that one will be the first of a great many which we will use. (Loud applause.)

Mr. Fleet (Portland, Me.) Mr. President and Fellow Members: Like Mr. Sands, I have something to say, but nothing to confess. (Laughter.) I would, however, if I may, ask a few questions of Mr. Hutchings. I do not know whether he would care to be pumped for the benefit of the rest of us or not.

I am rather inclined to think that the City of Rochester is perhaps a different proposition to operate electric vehicles or any other manner of vehicles in than is the City of Portland. Take Portland, for instance, with its small area of

21 square miles and 147 miles of streets, and only about 20 per cent. of that paved, and in that 20 per cent. over 20 hills ranging from 5 to 19 per cent. grade, and the main portion of the city built on a ridge where everything has to be hauled up hill from the wharves and down the other side to the outskirts of the city, it is a question in my mind whether you can make use of trucks in that city as economically as you can use horses. In Portland, with our average winter, we have anywhere from 50 to 75 days of sleighing. Now, while it would be quite possible to operate any power-driven vehicle on a street covered by car tracks, yet on the side streets the snow is not removed but merely rolled down—flattened out, so to speak—so as to make good sleighing. We do not attempt to remove the snow entirely from the streets, but to level it down to allow teams to pass. It is a question in my mind whether tying up these high-priced vehicles anywhere from three to four months every year and allowing them to stand idle, and then having to go out and hire horses at a further expense, would pay for that eight months in a city such as Portland is.

In the first place, do I understand correctly that if you let a storage battery stand idle for three or four months, it deteriorates possibly more rapidly than it does if it is operated?

My understanding may be wrong in this matter, but if that is a fact you have that extra deterioration to take care of. Then you have got to go out and hire a team at a higher price per month, or whatever period you have to get it for, than it would cost you if you kept these teams for the year round.

Again, is it possible in a city of say 75,000 to 100,000 inhabitants, to be able to operate a vehicle satisfactorily? The full extent of Portland, from one side to the other, is six miles one way by five the other. You cannot go more than three miles in one direction from the center of the city without being outside the city limits, or more than two and one-half miles in the other direction. Then you are out of the hard roads.

I notice a great many men in the City of Portland today who last fall told me that they would operate their automobiles throughout the entire winter, and particularly I notice my doctor among these men.

Things went along very smoothly until about the middle of February, owing to the fact that it was an exceptionally fine winter, but in the middle of February I found my doctor going up the street where there were car tracks, using a horse and sleigh. This was a man who forced his machine through, whether snow was there or not, if he smashed his machine, he could get another, but he forced the machine through.

In a small city like Portland, would this pay, or could it be made to pay? There are many smaller cities than Boston, where a machine could run 8,000 or 10,000 miles per year and never have to go outside the city limits or paved streets.

In Portland every man who owns an automobile almost without exception owns a small cottage somewhere out along the beach or perhaps up at the lake, and he may live up there or go out at night and return in the morning, anywhere from 5 to 20 miles away. If such a man owns an electric machine, necessarily he takes that machine at night and you have no chance to charge this machine during the night. He comes back in the day but all day he is busy with the machine. It is absolutely necessary that he have two sets of batteries.

I question very greatly where you can get any kind of an automobile or truck, I do not care whether it be gasoline or electric, to compete with horses in the smaller towns where the haul is short and the winters severe. If you can, I would like someone to show me how, because I believe that the electric automobile is worth the while of the central stations to look into; and if I can sell power from 12 o'clock in the night to 6 A. M., I am going to fill up the valley in my load; but will it pay any central station to advise their customers that an electric automobile is a good thing to have? I think the central station people must first go in and operate them themselves and then when a man comes to them they can say, "Yes, I operate an electric machine, and my results are such and such." It is just like the sign business, the story of which is told as follows: "I went out and asked a man to buy a sign. He looked at me, and with his face all smiles, said, 'Where is your own sign?' I immediately got busy and put up a sign. I sold many after that."

That may be the answer to the question, and it may be the answer to the outcome with the electric automobile. (Applause.)

THE PRESIDENT. Will Mr. Hutchings answer?

MR. HUTCHINGS. Mr. Fleet will see by referring to my paper that Rochester is no stranger to snow. In the month of February we had a total fall of 42.7 inches of snow. This does not mean that we had that much snow on the ground at the end of the month,—the record being that taken from the Weather Bureau. Would say, however, that the larger part of this snow fell in two storms. Throughout the entire month the principal carting and trucking company of the city operated five trucks with ease every day, which was not the case with their horses. The heavy electric trucks often extricated their horses from snow drifts during this period. It seems rather peculiar that a heavy five-ton truck when loaded will plow through snow with apparent ease, when a light pneumatic tired vehicle will be stalled. If you are up against hills you are not hauling five-ton loads over them with horses. It might be necessary, under conditions of heavy grade, to have extra batteries in order to get the maximum use out of your truck. The advantage of extra batteries was shown very clearly by one of our delivery companies, who operated twenty-one wagons throughout the entire month of February without any assistance, but instead of making from 45 to 50 miles per day they were making about 20 miles with one battery. Had they had an extra battery they could have continued to make from 35 to 40 miles.

Mr. Day Baker (of the General Vehicle Co.) I would like, Mr. Chairman, to reply to the questions and statements of the gentleman from Portland. Portland is a beautiful city. It is a city which I visit quite often. It is frequently referred to by its advocates as a summer resort, as a city having good sleighing except a few weeks in the summer time. Nevertheless, within a few miles of Portland, only 12 or 15 miles I believe, at Biddeford, we have in operation a two-ton electric truck and a one-ton electric truck, and I am informed by the manufacturing company who are operating them that they are on the job every day in the year, and that they are saving on the two-ton electric machine more than $800 per year over the horse-drawn vehicles. The difference between Portland and Biddeford is not so very great.

It is true that Portland has a great many hills and some grades of gradual rise, but whatever a horse can do an electric vehicle can do very much better and very much cheaper. If you are going to drive your horses over heavy grades, the horse's life is shortened very materially, and if you are going to run your electric car over the same grades the battery life is shortened very materially. It makes no difference how you are going to transport your goods, by steam, by electricity or with horses, you do affect the life of the horse or steam engine, and in the case of the electric vehicle the battery cost is correspondingly increased; but I think it will be found that in the hilly towns the electric vehicle works better in proportion than do the horses.

A good example is shown by the performance of electric trucks at the Amoskeag Mills. Snow at Manchester, N. H., is always greater than at Portland, but the Amoskeag Mfg. Co. are operating at present six electric trucks and will, as soon as orders are filled, be operating four more. They have operated electric machines the past five years' season every day in the year, over grades that are exceptional. The mill is located on the banks of the Merrimac river. The electric vehicles to perform their work have to ascend a twelve per cent. grade and rise twelve per cent. on the other side. The vehicles are obliged to go over this road from ten to twelve times a day, and although they have heavy work they are able to do the teaming at a great saving over horses at all seasons of the year. I think the grades are just as heavy and the snow as deep as in Portland.

At the Nashua Manufacturng Company, Nashua, N. H., where they have a great deal of snow, they are operating an electric machine and doing good work. At Lawrence, Mass., a number of electric vehicles are in the service of the Arlington Mills and the Pacific Mills, and in both cases we hear the highest praise of the electric machines. The snow difficulty is to be met there, but they are operating notwithstanding the snow, but they do not yet get the best results on account of inexperienced operators. Nevertheless, these machines are being gradually adopted by conservative New England and after a winter's experience the drivers become accustomed to the operation, and the snow presents no great difficulty.

The heavy electric trucks seemed to run through the snow and over heavy grades very much better than the horse-drawn vehicles, and I predict a great and successful future for the scientifically and thoroughly constructed electric wagon and truck. (Applause.)

Mr. Oviatt. (Providence.) Mr. Chairman, I have noticed in the papers and discussions of electric vehicles, furnished by the Electric Vehicle Company, the Storage Battery Company, etc., that practically all comparisons have been made between horses and electric vehicles. I would suggest that the Electric Vehicle Company and the storage battery companies would do well if they would furnish data which would give the comparison between gasoline and electric power, which has not so far to my knowledge been furnished.

When the electric light business first started it was naturally a competitor of gas. All data was based on comparisons between gas and electric light, and they were the two important things for consideration. In the electric vehicle discussion the comparison is not between horses and electricity, but between electric vehicles and gasoline vehicles. Now, if gasoline machines are better than electric machines, that is what we want to know, not what we can do in comparison with horses.

The President. I will present Mr. Stone of the Electric Vehicle Company.

Mr. Stone. Mr. Chairman, there is a gentleman present more competent than I to make comparison between the cost of operation of automobiles by electricity and gasoline, and he is one whom I think will be able to give something of decided value. I might also say that there have been a number of articles published upon that subject.

While on my feet I want to say that it is particularly gratifying to hear what has already been said regarding the electric vehicle.

About a year ago we organized The Electric Vehicle and Central Station Association referred to, and I desire to extend thanks in behalf of the Association for the complimentary remarks just made regarding its work. We have succeeded in bringing together the electric vehicle and the central station interests and to bring out matters of importance to both parties so that each might see what the other had to deal with. The Association has been very successful in its work and a great deal has been accomplished. The good influence of the work carried on by The Electric Vehicle and Central Station Association has spread to other sections of the country. It has proved contagious and is developing rapidly in other quarters. I believe the object worthy of the very best support of this Association.

Referring to Mr. Fleet's remarks regarding the hilly conditions existing in Portland, I lived in Portland, when a boy, and am thoroughly conversant with the existing conditions; and from my knowledge of the work that electric vehicles are doing in other quarters, there is nothing in Portland to debar the electric vehicle. It is true that the battery would be called upon to discharge at high rates while on these grades, and this would naturally tend to reduce the available mileage radius of the vehicle. I should consider the Portland situation a perfectly commercial one. It would not be necessary to put the batteries out of commission during the snow season. That has been well demonstrated in Boston, during the three severe blizzards experienced this winter, when electric vehicles were doing their daily service and were not affected as much as other methods of transportation.

For your general information, I would say that my Company has issued a list showing about two hundred charging stations in New England, where batteries can be charged; sixty-seven of which are central stations. In the vicinity of Boston there are in the neighborhood of 100 charging stations. This list is gradually being increased. The charging stations are becoming so numerous that if an electric vehicle should by accident find itself short of power, a boosting charge may be sufficient to have it complete its work and return to its own garage.

A Chicago gentleman recently presented some very interesting figures. Chicago, he says, has about 80,000 horses. The cost of feed would vary from $125 to $150 per year. If that sum were converted into electric current it would mean approximately a $12,000,000 gross income. This exceeds the present income of their central station. These figures are given to show the possibilities which the electric vehicle business presents.

Mr. Kennedy. Mr. Chairman, I would like to reply to the gentleman who asked for information on the question of the comparison between electric and gasoline machines; and in that respect I would say that the difficulty of making an accurate comparison between gasoline and electric machines as far as operating costs are concerned, is due to the fact that the gasoline machine has not been used for commercial purposes successfully long enough to afford us the necessary data. It is a strange thing that there are no large installations of commercial gasoline cars in service for three years. There are very few installations of gasoline cars where the vehicles are likely to last three years. The principal argument in favor of the electric as against the gasoline vehicle is in the fact that it takes practically the same weight of vehicle for heavy haulage for both types, although the popular opinion is that the electric vehicle is much the heavier. That being so, you can readily see that the principal weight in the gasoline machine is made up of machinery, largely consisting of reciprocating parts, which naturally mean wear and tear. And then the majority of the machinery in the electric car is inert, and instead of reciprocating parts we have rotating parts and one moving part in each motor. The reason which appeals to the user in the electric as against the gasoline vehicle is in the quality of help. The ordinary horse vehicle driver can be made an electric vehicle operator and a merchant can thus use, if he changes, the same employee. If he were to employ gasoline machines he would be compelled to supersede the horse-driving class of men by mechanics. It is very difficult to get good, experienced chauffeurs to employ on the gasoline apparatus, consequently, the only men available are machinists who are very anxious to know how to run the gasoline car, and they get their experience usually at the expense of the owner, and just as soon as they become proficient in operating a commercial vehicle they are looking for a touring car job, which pays more and gives them less work.

Another thing: The question of design in the gasoline car is very much unsettled, particularly in relation to the transmission, and we can go back to the street car practice in the laying out of electric vehicles. Practically the same formula is used for the development of electrical machines as is used in the design of street cars.

Another great advantage that the electric has is that almost any truck can be made to perform a great variety of service by the substitution of one battery for another. That is, if the purchaser buys a gasoline car he has a car that is developing just its limits; if he should buy an electric car, and he finds after a while that he wants to do a great deal more work than he expected he had to do, he can very readily put in a larger battery within the limits of the structure of the machine. I hope that answers the question.

I want to enter a plea with the central station man in taking up this electric vehicle field to maintain an attitude of neutrality with regard to the various manufacturers, because the difference between the design and structure of electric machines is not very great, and that is pretty well in evidence by the numbers of electrical machines of all designs that have been in operation for the last ten years. There has been a great deal of criticism, perhaps commercially necessary, on the part of salesmen between the design employed by one manufacturer as against the design employed by another. Now, bear in mind that the manufacturer has more at stake than anybody else in a general way, although he has not so much permanent benefit from machines sold as the central station man has. When the manufacturer sells a machine he is largely done with it as far as financial income is concerned. Of course, he has some further interest in it. He has to protect the machine he is manufacturing, and see that each machine he sells may be the fore-runner for many others. But the central station man gets a permanent revenue from nearly every machine that goes into the service, and I believe as time goes on the tendency will be to operate electric machines from central garages, which will be controlled by the local electric light and power companies. And it is in that field, the garage field, that the central station man can play a more important part than in any other, because it is to his interest to maintain the vehicles in his district in efficient operating condition in order that the vehicles may work every day in the year. If central stations maintain garages for the repair and the general up-keep they can afford the preliminary expense, and it is one which may be necessary for quite a long time. Sometimes it may be prudent and occasionally necessary for the central station man to become the agent of the manufacturer, because in taking the agency for some particular manufacturer he can more quickly participate in the business in his district. Most any of the central stations that have taken that attitude up to the present time have had finally in mind the period when they will relinquish the agency and become neutral. Those companies which have taken agencies have been of great assistance to the business at large, because in localities not adjacent to the manufacturer's headquarters or his branches or sales agencies the local purchaser will put a great deal of faith in what the central station man represents to him as far as the performance of the vehicle is concerned; and the central station, being more or less of an engineering institution, is in position to appreciate the fundamental principles and secure the confidence of the owner. If the central stations should become the agents for the manufacturers, I believe the policy which ought to be kept in mind is the revenue which will come to the central station through the current sold, rather than the revenue which will come temporarily from the sale of machines, because if they become interested in the latter they will naturally get into competition or differences with other manufacturers, while by maintaining an attitude of neutrality they will multiply the forces at work.

It has been said that some manufacturers seem to disregard the details of the design of their vehicles and do not give the same attention, apparently, to the efficient performance of electric trucks as they do to that of pleasure vehicles; but I can answer for my firm that we know what we are doing and we have a good deal of money at stake. We have at the moment, as an indication of the impetus that has recently been given to the business, a million and a half dollars' worth of trucks going through the factory, and that is only part of what we believe we shall be making within a couple of years. It only scratches the surface. That indicates what can be done; and the only way to go at the business is with a sense of the responsibility devolving upon us.

There is not very much real difference between the operation of one machine and another. But what ought to be brought to the notice of intending purchasers is that with the electric machine the purchaser can make one driver two and oftentimes three times as useful as he was formerly, and he can eliminate 50 to 60 per cent. of his labor, and his pay-roll is half of his expense. I do not wish to say any more.

THE PRESIDENT. I would like to hear from Mr. Stetson of New Bedford, if he has anything to say about the use of electric vehicles in that city.

MR. STETSON. I hardly think I have had experience enough, Mr. Chairman, to say anything of great value. In the past year we have purchased two vehicles, one a 2000-pound and another an 800-pound truck, for the purpose of taking care of our business. At the present time they are working entirely satisfactorily. We are doing a great deal of work with them, and more and better work with each of them than we could in any other way. They are more economical and get more range, and it is impossible to drive an electric as slowly as a skilled driver can drive an ordinary horse. In our last storm we got through quite easily. Our electric trucks put in twenty miles, and I doubt if any horse could have put in eight miles under the same circumstances. So in that one day we considered that we secured a large amount of revenue through the use of the truck. In the matter of the capacity of the wagons, we can put out twice as many meters with the 800-lb. truck than with the ordinary business wagon, and when it starts out in the morning it is good for a day's work. So far as that goes, I don't see how a company with the great business we have and the distances we have to travel can get along without the substitution of electric vehicles for horse work. We were using eighteen or twenty horses during the season, the trucks cutting down this cost, and the charging of the trucks at the electric station, of course, you do not know anything about. It can be done at hours when your cost of current is less than at any other time, and as between coal and oats, coal will beat every time.

THE PRESIDENT. I should like to hear from Mr. F. E. Smith of the Edison Company, who has had a great deal of experience in the use of the electric automobile, before we adjourn.

MR. SMITH. I cannot add much to what Mr. Hutchings has said. My experience has been much more limited than his. I believe the more experience we have the more results we get that are satisfactory. I think the gentleman from Portland mentioned some things which should not be slid over lightly. In a recent storm, the worst we had in twenty years, we learned some lessons which we may turn to very good account. We were reduced to about one-half of our mileage with our cars, and I wondered how we compared with the horses; and I used to make it a point to stop and talk with drivers of coal teams, etc., to get their experiences, and I found that they were up against it harder than we were. Every one of our trucks went out and came in with its own power. Our mileage dropped one-half and our current more than one-half—that is, we worked up to nearly the battery limit; we were obliged to work up very close to the battery capacity. I think the further north you go the harder it is, and if you went to Etah, you would not find the electric vehicle of much use up there; but I do not think Portland is so far north that it would come into the zone where the electric vehicle would be thrown out of commission. I think the Portland man can reap some of the benefits to be derived from the advocacy of the use of the electric vehicle.

The gentleman inquired as to the comparative cost. The first modern car that we used is being at present overhauled and painted and I was disappointed at not finding something to do to it. The total expenditure was for spring links and bolts and two small sprockets for driving chains. The rest is for paint. And that car has travelled 8,000 miles! A new battery will go into that car, but batteries are not charged up to our general overhauling account. That is the new type of car that we have. It has never been towed into the station, and never has lost a day of work. It will bear comparison with any of the gasoline cars, in my experience. The gasoline car fits more into the line of freight carrier, drawing for long distances. If put into the city work its costs are advanced very materially, when compared with its work on the long runs, that the electric machine would not attempt to touch. They both have their faults and virtues. I don't think a comparison can be made on the same class of work. The electric vehicle man will not attempt to tell you that his machine would carry loads to Fall River or long distances, as the gasoline machines will do. The wear and tear on the shoes is greater on the gas car, also on the gears, clutch, etc., when used on city work.

(Adjourned, at 3.22 P. M., till Thursday, March 17, at 10 A. M.)

SECOND DAY.

Boston, Thursday, March 17, 1910.

The President called the meeting to order at 10.30 A. M., and said:

I see among us this morning several faces that were not here yesterday, and I presume we will get a good deal of their eloquence during the sessions today. We have rather a strenuous program with the two sessions today and one this evening, and I want to hurry them along as fast as we can. The object of having but one paper at each session has appealed to you all, I presume, as there is generally not so much good coming from these conventions when we have a crowded list, and so we have confined ourselves to only one paper for each session.

I have a few announcements to make before starting in with our program. Yesterday I asked, if any one had any suggestions to make, that that person put them in shape so that they might be answered at our session this afternoon. I did not think to call your attention to it again before the close of the meeting. If any one has questions, if he will give them to Mr. Campbell and allow him time to look up answers, it will help us. Has any gentleman any questions he wants to ask at this time? If any member has any new business that he desires to bring before the convention, there will be an opportunity given this afternoon.

There seems to be a little misunderstanding in regard to the question of membership in the New England Section. This body, as you very well know, is a section of the National Electric Light Association. It does not cost you anything to belong to the New England Section; in fact, your application for membership in the National Electric Light Association includes membership in the New England Section. You pay your dues to the National Association and they turn back part of them for the use of the New England Section, so that when you become a member of the National Association you automatically become a member of the New England Section.

I will add that there is *no additional expense* in belonging to the New England Section. If you are a member of the National Association, you are a member of the New England, upon signing an application blank; and if there are any gentlemen here who are not now members and wish to become such, they may obtain application blanks at the registration room, provided for the purpose. For the Class B members the entrance fee is five dollars and the annual dues are five dollars. The National Association has waived the entrance fee until April 21st, so that by the payment of the 1910 dues, which will be five dollars, you become a member for nothing.

It only costs you five dollars yearly to be a member of the National Association, as well as the New England Section. That also applies to Class E membership. Now I will answer any question.

I want to call your attention to the necessity of getting your tickets for the banquet this evening if it is your intention to be there, as we must know as soon as we can how many members are coming so that accommodations may be provided for them. It may be interesting to know that we expect about two hundred members,—some 180 or more have already purchased tickets, also that the registration of members up to last night was 255, which is an unusual showing; something we never have done before, and it plainly indicates the interest that is being taken in this convention. I hope each one of you will be able to send in the names of others for membership. We want at least one thousand members in New England. As we are now leaders in this movement of geographic sections we want to keep ahead of the other sections of the country, and I hope you will do all you can to assist this movement.

Before we take up the paper to be presented this morning I want to say that we have with us a gentleman who has taken time and trouble to come to Boston for the sole purposes of attending our convention and saying a few words to us. This gentleman is probably well-known to you all, as most of you saw him at our meeting at Portsmouth, last September; and while he will not say much to us this morning, we hope to hear further from him at the afternoon session. It now gives me great pleasure to introduce to you the President of the National Electric Light Association, Mr. Frank W. Frueauff. (Applause.)

REMARKS OF MR. FRUEAUFF.

Mr. Chairman and Gentlemen of the New England Section: I simply want this morning to express my great pleasure in meeting with the New England Section again. I recollect the very interesting meeting of last fall and I have looked forward to meeting you again. Since that meeting I have had the pleasure of attending some of the other geographical sections and of state organizations who are planning to become members of the National Association. In what I will say this afternoon I will go into the detail of what others are doing and what the plans are for the near future and for our next annual gathering. You have a full program and I will not detain you. It is a great pleasure to see the progress of the New England Section, which is ahead of any of the other geographic sections, and the National officers, I assure you, are delighted with the progress made by this New England Section. (Applause.)

THE PRESIDENT. The paper, "Insurance from the Engineers Standpoint," to be given this morning is certainly one of the most interesting and important matters that can possibly be brought to your attention. The author of this excellent paper is so well-known all over the country and has given this matter so much attention and thought that it can not but be very interesting to you all, and I am very glad so many members are present to listen to this valuable paper. I therefore take pleasure, without going into any further detail, in introducing to you Mr. William H. Blood, Jr., of the Stone & Webster corporation, of Boston. (Applause.)

INSURANCE FROM THE ENGINEER'S STANDPOINT.

BY W. H. BLOOD, JR.

The subject which was assigned to me for the evening was "Insurance." The magnitude of the title overwhelmed me, and I realized the impossibility of touching even a few of the high spots at a single sitting, though I might know the subject ever so well, and I make no claim of this kind, assuming only a sort of speaking acquaintance with certain features of the subject.

I feel very much as the man did who was given a shovel to dig away a mountain. He was perfectly willing to attempt the task, but was afraid that in doing so he might be digging his own grave. I certainly have no desire to be buried, and so have taken the liberty of limiting my talk to "Insurance from the Engineer's Standpoint," and shall endeavor to confine my remarks to some features of fire insurance which the designing engineer frequently overlooks, and for which the operating engineer has to suffer.

Insurance is defined as a contract whereby for a stipulated consideration, called a premium, one party undertakes to indemnify or guarantee another against loss by certain specific risks. The person who undertakes to pay in case of loss is called the "insurer"; the dangers against which he undertakes the "risk"; the person protected, the "insured"; the sum which he pays for the protection, the "premium"; the contract itself when reduced to form, the "policy."

The question which naturally comes up and which ought to be answered at the outset is, Why does one insure? It is perhaps easy to say why one takes out a life insurance policy. We all know that death is certain—that the life policy will some day be cashed. Just when this will occur is uncertain. We feel that we cannot take the risk of leaving those dependent upon us unprovided for. We are willing to pay a definite amount, or premium, year by year, to assure the payment of a definite sum at our death. If each one of us were to live just as long as the average now lives, such a procedure would be unnecessary, provided we set aside and invested wisely each year the same amount that we now pay in premiums. But some of us do not live as long as the average. Many of us would not set aside the amount we now pay in premiums, and others of us would not make wise or profitable investments. We insure in order that those dependent upon us may be positively assured of having a source of income after we cease to provide. We realize that a portion of the money we pay in premiums is used for expenses of management of the life insurance company, and that some of it goes for profits, still we feel that it is wise to carry a life insurance policy because we believe that a company which devotes its entire attention to a life insurance business can make better and surer provision for our surviving families than we can make ourselves. Besides this, we know that the minute we become insured there is a fund available to pay the policy in event of our death, whereas if we attempted to accumulate the same amount it might take perhaps five or ten years, and the possibility that we might die meanwhile would always have to be considered. The same principles hold true in accident insurance—well illustrated in my own case. I have been carrying a policy with a certain well-known accident company for some seven years, paying my premium regularly; yet I have never had an accident. If next week, however, I break a limb in a collision on a railway car, it will be a great satisfaction to collect $50 per week if I am confined to my bed for several months. My broker in renewing my policy last month writes, "You may be interested to know that you are about the only accident policy holder on my list that has made no claims, to my knowledge, during the seven years that you have carried this." It seems that my experience is better than the average.

Fire insurance is, in many ways, similar to life insurance, but there are a few points of difference. Not every building burns; there is no such thing as "probable life." When one does burn, however, if it is insured, it is rebuilt through the funds accumulated for that purpose, and its earning capacity is thereby restored.

We might carry our own fire insurance, but to do this safely we must establish a fund large enough to pay any loss which may occur. If we could escape disaster for a long term of years, self-insurance would be safe; but suppose a fire wipes out the property within a few months or a year or two after it is built, in which time no fund has been accumulated, where will the cash come from to meet the cost of rebuilding?

Insurance is wise largely because it is safer to deal with averages than with individual cases. Insurance companies are ready and have funds with which to pay losses as soon as they occur. These funds are the accumulation of premiums which we pay year by year. They are backed, of course, by the paid-in capital of the company. You may never have a fire, yet you pay into the fund a certain amount each year. A hundred other companies may have the same experience that you do, yet the one hundred and first company may have a serious loss, which will require the greater part of the accumulated premiums to pay. This company reaps the benefit of being insured, and the same disaster may overtake you next year. Some large industries, which have widely separated risks and a business which is profitable, have tried self-insurance to advantage; but the ordinary electric light or street railway company by itself cannot afford to carry its own insurance. It is hardly safe, and few trust companies would permit it under the terms of the ordinary mortgage. A syndicate controlling a large number of properties in different cities may perhaps undertake self-insurance with safety, but it should not entirely cast loose from the regular insurance companies until it has created a fund sufficient to care for a complete loss on several of its largest hazards.

Various mutual insurance schemes have been tried; many of these have been unsuccessful. Those which have, during a term of years, worked out profitably are best illustrated in the New England mutuals, which conduct their business on a co-operative basis and take only selected risks and have no soliciting forces. This plan obviously enables the companies to operate at the minimum amount of expense, and with comparatively small losses because of their excellent inspection system and severe requirements.

During the past few years we have heard considerable about some electric Mutual Insurance Companies which were being formed. The idea of the promoter was to insure only electric light plants, street railway power houses, car barns, etc., and to handle the business on a mutual basis, thereby eliminating agents' commissions, and so enabling the public service companies to get their insurance at cost. The underlying principles are sound, but for various reasons the companies have not yet been able to make much headway.

The stock companies, on the other hand, do not run their business on a mutual basis, but are in business for profit. It is ordinarily figured that only about 55 per cent. of the premiums paid to these companies is used for the settlement of losses, the other 45 per cent. being consumed in agents' fees, office expenses, taxes and profit. With some companies and for some years this profit may be a minus quantity, but ordinarily the business is a remunerative one. Do not misunderstand me. I am not accusing the stock companies of earning too large a return on their investment or of paying exorbitant dividends. They are certainly entitled to more than a banking profit; their business, like the electric lighting and street railway business, is hazardous, perhaps even more so, and they are entitled to a good deal better than six per cent. return on their money invested.

Whatever may be an electric light or street railway company's methed of carrying its insurance—whether it is placed with the stock companies or with the mutual companies, or carried by the company itself—it makes no difference as far as the main underlying principle is concerned; a fund must be ready to bring about immediate rehabilitation. Unless this fund is instantly available, the whole scheme is wrong. No public service corporation can afford to take such a risk; it must be in a position to rebuild immediately. The monopolistic position which a public service corporation holds carries with it the obligation of furnishing continuous service.

More important, therefore, than paying for the loss occasioned by the fire is preventing the destruction. The aim of the manager should be so to construct and so to operate that his undertaking shall be free from fire. If the building is improperly constructed, even the best of management cannot fully compensate for faulty construction; on the other hand, with perfect construction, bad management may make the risk a poor one. Many operators do not fully realize how serious a matter a fire is. The fact that the property is insured, and that the loss is made good by the insurance company, seems to satisfy many; but does this cash payment for your station make good the diminution in income, or does it in any way return to you the confidence which the public loses when a plant shuts down on account of a fire? Although your building may be restored, without expense to you, after six or eight months, what has been the effect upon your earnings and upon the dividends of the company meanwhile? Does even a so-called "unavoidable" fire absolve you from furnishing continuous service? Do you suppose that the manager of a theater, for instance, cares why he does not get the current with which to light his building when he has a performance scheduled, or do you think it satisfies the man who lives three or four miles out in the country to know that cars do not run because the power house which generates the current for running them has been burned? What both of these men, the manager of the theatre and the street car patron, want and what they are entitled to, is continuity of service.

How shall this continuity of service be secured? First, by so building that a fire will be unlikely. Second, by so protecting the property that if a fire is started it may be localized or extinguished before serious damage is done. Third, by so looking after the details of management that the starting of a fire may be minimized.

Outside of these three there is one other matter which must be considered; that is, the conflagration hazard, as it is called, or the possibility of a sweeping fire attacking the property under consideration.

Before considering these features from the electrical engineer's standpoint, let us see what the insurance people have done along these lines.

A number of years ago a carefully selected committee of the underwriters was chosen which was called "The Universal Schedule Committee." The aim of this Committee was to secure a rate based upon experience, which, with allowances for proper expenses and for accumulation for periodical and inevitable sweeping fires or conflagrations, would leave a margin for a profit for the insurance companies of five per cent.

In order to arrive at the proper method of applying the Universal Schedule, the Committee took several matters into consideration. It first established what is called "The Key-Rate of the City." To this rate was then added charges for deviations from standard construction of the particular building under consideration. Features of exceptional construction of rare occurrence were then treated as deductions. Deductions were also made for fire extinguishing appliances, sprinklers, etc. Then the question of exposure was considered. After this came the co-insurance feature, and, finally, faults of management were taken into consideration.

The idea of this Committee was to secure not only uniformity, but accuracy in rating, and by charging for deficiencies from standards and recognizing exceptionally good construction by deductions, it was hoped that the architect, builder and property owner would be informed at the outset and would thus be led to avoid many of the faults prevalent in ordinary construction, and that they would be induced to give more care in choosing building materials, fire resisting and extinguishing appliances, which would in the end bring about not only safer individual risks, but those which should be freer from the contingency of sweeping conflagrations.

As a result of this Committee's deliberations, they, in the first place, defined a standard city, which is as follows:—

> "A standard city is one having gravity water-works with head sufficient at all hours to throw over five-story buildings. The main supply pipe to be in duplicate unless intermediate storage reservoir be provided. Water pipes and mains to be not less than six inches in diameter in dwelling section, and not less than eight inches (as a minimum) in mercantile section (they ought to be ten and twelve

> inches); a paid fire department, 12 men to each steamer; not less than two steam fire engines to each square mile of compact portion, or one to teach 10,000 population up to 500,000 population; hook and ladder trucks, one to every four steamers; fire-alarm telegraph; efficient police; paved, macadamized or other hard streets, the majority of which—say 60 per cent.—are 70 feet or more in width; a good building law, well enforced; no outlying exposures, such as lumber districts, etc., to cause sweeping fires; no unjust municipal and State taxation and a previous five-year fire record of not exceeding $5.00 annual fire loss to each $1,000.00 of insurance.

After having defined a standard city, the next point to take up was a standard building, which is as follows:—

> "A standard building is one having walls of brick or stone (brick preferred), not less than twelve inches thick at top story (16 inches if stone), extending through and 36 inches above roof in parapet and coped, and increasing four inches in thickness for each story below to the ground—the increased thickness of each story to be utilized for beam ledges. Ground floor area not over 2,500 square feet (say, 25 by 100); height not over four stories, or 50 feet; floors of two-inch plank (three inches better), covered by $\frac{7}{8}$ or one-inch flooring, crossing diagonally, with waterproof paper or approved fire resisting material between (if tin or sheet iron between, see deductions); wooden beams, girders, and wooden story posts or pillars twelve inches thick, or protected iron columns; elevators, stairways, etc., cut off by brick walls or by plaster on metallic studs and lathing, communications at each floor protected with approved tin-covered

> doors and fireproof sills; windows and doors on exposed sides protected by approved tin-covered doors and shutters; walls of flues not less than eight inches in thickness, to be lined with fire-brick, well-burned clay or cast iron, and throat capacity not less than 96 square inches if steam boilers are used; all floor timbers to be trimmed at least four inches from outside of flue; heated by steam; lighted by gas; cornices of incombustible material; roof of metal or tile; if partitions are hollow or walls are furred off there must be fire-stops at each floor."

This standard building, it should be understood, is a mercantile establishment, and the description does not apply to an electric light or street railway power house.

The result of this Committee's work was most beneficial and the main principles have been continued. The application of this plan has, from time to time, been modified and adjusted, but, in general, the fundamental ideas have stood the test of time.

As you gentlemen are electrical engineers, you are more particularly interested in electrical risks as contrasted with mercantile risks.

The New England Insurance Exchange, one of the most enterprising and progressive insurance organizations in the country, took the Universal Schedule and revised it so that it would apply to electric light and power stations, and they have been publishing, for the past fourteen years, a schedule which they call their "Requirements for Standard Electric Light and Power Stations." This schedule considers, first, the character of the building itself, together with the occupancy and exposure of the building. It then takes up the condition of the electrical arrangements—generators, switchboards, resistance boxes, lightning arresters, etc. Then follows the question of care and attendance which the building has, and finally, the fire protection which is afforded, both the internal protection, consisting of fire pails, hose, etc., and the external protection, with reference to water supply, fire department, fire alarm, etc. This schedule covers only non-fireproof buildings, but built as best as may be under non-fireproof conditions. When a building is erected in accordance with these specifications and has the care and attention called for, together with the fire protection specified, the premium rate per $100 of property insured is set at 45 cents throughout New England. In other localities this base rate, as it is called, may be entirely different.

This is the rate on what is termed standard electric light and power stations. It is the lowest flat rate which can be secured on a non-fireproof building without co-insurance. If the structure is not in accordance with the schedule, and if the protection and the care in attendance are below standard, "deficiency charges" are added. A few examples of this will suffice.

If the walls of the building are of frame instead of brick or stone, the deficiency charge is 35 cents, which means, that under these conditions, the total rate would be 45 cents, the base rate, plus 35 cents, or 80 cents. If the roof is shingled instead of being metal, with metal trusses and supports, a deficiency charge of 25 cents is added. If the boilers are not installed as required, the electric light company is penalized 20 cents. Deficiency in wiring calls for from 20 to 35 cents additional. A switchboard made out of wood and set against the wall is scheduled by the rate makers to add 70 cents.

When it comes to care and attendance, some of the deficiency charges are very high. If oils, gasoline, etc., are stored in the station, $1.45 may be added to the base rate; and the underwriters think that it is just as bad to keep ashes in combustible receptacles, for they make the same charge for this practice.

In considering the fire protection, if there are no pails filled with water, 15 cents is added to the deficiency charge, and if the company fails to supply a hose, this same amount is added. The external water supply which is available for fire should be furnished by two double hydrants with not less than six-inch mains within 500 feet of the building. If these are not furnished, at least ten per cent. is added to the rate which has already been fixed, and a deficiency charge of the same amount is added for a faulty fire department or an inadequate fire-alarm system.

A great many of these deficiency charges seem to be out of proportion to the base rate, and, as a matter of fact, they are, and they are purposely placed high so as to force the electric light company to make the necessary changes which will obviate the deficiency charge. For instance, insurance companies do not think that an additional charge of $1.45 would cover the risk of allowing gasoline to be stored in the station, yet by putting the rate as high as this the company will be forced to store the gasoline out of doors. Seventy cents additional probably does not cover the risk of putting in a wooden switchboard placed against the wall of the building, but the charge is so high that it would deter any reasonable manager from operating his plant with a type of switchboard which had been tabooed.

When it comes to a fireproof station the New England underwriters are apparently at sea; they have no standard specifications or standard rate; they recognize, however, the improvements over ordinary construction and, apparently, at least, make an arbitrary rate which they expect will satisfy the insurer and at the same time return to them a profit. Their rates are generally low enough to influence the type of construction of new buildings.

One of the principal objects of this paper is to call the attention of the members of the engineering profession to the necessity of building right. A change in structure in an old building it is, perhaps, impossible to make and it is always expensive and, oftentimes, from a financial standpoint, not warranted; but in the planning of new buildings certain features should be taken into consideration by the engineer, and if he follows out carefully the requirements for standard stations, the first cost of the building will be but little, if any, more than that of a faulty structure, and the saving in cost of operation, due to decreased premium rates, may be quite material.

The ordinary architect is not an electric light man, and while he may be able to build a structure which is architecturally beautiful and which is strong enough and of sufficient size to take care of apparatus to be installed, he seldom knows as much about operating conditions as does the electrical or insurance engineer. The architect may think that a wire tower is an ornament to the building, but unless it is built in accordance with the underwriters' requirements the premium rate is about half as much again. He may think that a wooden floor of slow burning mill construction is good enough for an electric light plant, but the installation of this will cost the owner at least seven cents on every hundred dollars' worth of property which is invested in the building and its contents. He may not know what feeder equalizers are, but if he does not provide room for them, or if it becomes necessary, because of faulty planning, to put the resistance boxes in the basement, on a wooden ceiling, this, besides entailing an additional annual charge of seventy cents per hundred dollars on the entire value of the plant, may be the cause of a fire sufficient to put the electric light plant out of commission for several days.

I have very briefly called attention to some of the reasons why proper attention should be given in the original design of the building. In this connection the original design should also cover the protection of the property. Where the town or city water supply is inadequate or lacking, fire pumps should be installed and kept ready for immediate use. Fire hose, of course, is important, and the underwriters have standard specifications covering its installation. It should be supplemented with a supply of fire pails, part of which should contain dry sand, the others to be filled with water. Automatic sprinkler systems are being used quite extensively and with very good results, although the placing of sprinkler heads over switchboards and dynamos is not altogether a desirable practice. The value of a sprinkler system depends upon its being ready to work at any instant, day or night, summer or winter. It is not intended to prevent a fire, but rather to localize it or extinguish it before it has assumed serious proportions. Its value in certain types of risks is unquestioned and when installed brings about a reduction in rate of at least 50 per cent. from the stock companies, and often makes the risk attractive to the mutual companies, thereby enabling the operating company to secure competition in placing its insurance.

The selection of the location for the plant is, of course, important, and is generally regulated by the price of real estate; but of two pieces of real estate of equal value and with equal facilities, the one having the better city water supply would be chosen. When it comes to the question of a fire department and a fire-alarm system for the town or city, these matters are generally outside the control of the electric light company, but the fire underwriters wish to have the electric light station within half a mile of the fire department building and require that the fire-alarm signal boxes shall not be farther than 250 feet away from the building.

The question of operation, or, rather, the care of management, is a third matter which should be considered, but is one of such great detail that only some of the principal points can be spoken of here tonight. It is, however, of great importance, and it is my personal opinion that more fires in electric light properties come from faulty management than from poor design. Since writing the above, I find that Mr. C. M. Goddard, Secretary of the New England Insurance Exchange, made the public statement that "Fully 50 per cent. of our fires are due to what we technically call faults of management. This includes all sorts of easily avoidable conditions which are likely to cause and aggravate the fire hazard. A more common word would be 'carelessness.'"

Most fires are preventable, and start from either carelessness or lack of attention to details. Ordinary foresight and systematic and careful inspections at comparatively little expense should remove most of the causes of fire. The accumulation of shop sweepings, rubbish, etc., is a prolific source of the starting of fires. The throwing of oily waste upon the floor in dark corners or in wooden boxes is almost criminal. Metal cans are ordinarily provided for it, but through lack of inspection often fall into disuse. Sand and water pails are generally furnished with almost every electric light station, but, oftentimes, the sand pail is turned into a cuspidor and the water pail is used in place of a washbowl, or, on account of lack of attention, is allowed to dry up. Fire hose should be kept for emergencies, and should not be used for washing the manager's automobile or for sprinkling the grass. Chemical extinguishers are not to be set upon shelves as ornaments, but should be kept charged and in working order for immediate use. An automatic fire door cutting off the boiler-room from the generator room is a valuable adjunct, but if barrels, crossarms or coal are piled up against it the automatic feature is removed, and it becomes worse than useless. A basement in an electric light plant is always a dangerous thing, but when it is used as a place in which to unpack barrels or for the storage of arc light globes in open tierces filled with straw or hay, it becomes a particularly bad menace. The oily overalls of machinists and others are most undesirable things to have stored away in dark, warm corners, and the careful manager either provides metal lockers or at least has the overalls hung away from the woodwork, and in readily accessible places. A plant which is oily and dirty brings about a general shiftless condition throughout, and a careful inspector can almost always tell as soon as he steps inside an electric light plant whether or not the risk is a good one.

For plants of large size fire drills are desirable, and for the smaller plants it is essential for every man in them to remember where the fire-alarm key is kept, to know the location of gate valves and fire hose, and to realize that a pail of water or bucket of sand used when the fire first breaks out is better than many barrels of water ten minutes later.

In considering this question of insurance, we must not forget the possibilities of a general conflagration. This is a hazard which cannot wholly be avoided, but by a proper location of the building it may be reduced to a minimum. Keeping the main building away from other structures certain distances reduces the likelihood of a fire occurring outside the building and sweeping across and through the electric light plant. It is, of course, better to keep away from other buildings at least 100 feet, but if one is obliged to build within fifty feet, approved fire walls should be constructed. Openings of any kind in these exposed walls are objectionable, but windows provided with approved metal shutters are permitted.

Thus far I have said nothing about co-insurance. A co-insurer is one who carries a portion of the risk. The electric company generally carries some portion, that is, the property is seldom insured for its full value. When an insurance policy contains a co-insurance or average clause, it means that the property is to be regarded as insured, either by the underwriter or by the company itself, up to the ratio fixed by the percentage called for in the co-insurance clause. To illustrate: If the company carries insurance on its property up to 60 per cent. of the value under an 80 per cent. clause, the company is a co-insurer to the extent of 20-80, or 25 per cent. in case of any loss up to 80 per cent. of the value, and for the full amount of any excess over 80 per cent.

It is well recognized that the lower the ratio of insurance carried to the value of the property, the greater is the risk for the underwriters ignoring the moral hazard, which we will not consider. This is illustrated in case of a fire damaging property to a small percentage of its value, but approaching the total insurance carried, so that from an underwriters' standpoint the loss is nearly total.

Conversely, the higher the ratio of the insurance carried to the value of the property the lower will be the percentage risk of the insurer, since total losses represent only a small proportion of all fires. The underwriters recognize this feature in making their rates of premium, reduced rates being most commonly promulgated on an 80 per cent. co-insurance basis.

Other co-insurance clauses which are commonly used are 50 per cent., 75 per cent., 90 per cent. and 100 per cent., but except in the case of fireproof buildings not exposed to conflagration hazards and not containing combustible contents, a ratio lower than 75 per cent. is not to be recommended.

It is preferable for the company to become a co-insurer under, say, an 80 per cent. clause, as indicated in the above illustration, if the insurance premiums must be reduced, as in this way it gains a more adequate protection in case of severe fires, for which insurance is most needed.

The fire underwriters realize that the designing and constructing engineer cannot know all kinds of businesses, and that any assistance which they can give in outlining standards of construction will be appreciated. For this reason they have prepared, at considerable expense and trouble, specifications on various forms of construction, and pamphlets describing these may be obtained upon application. They have a complete building code, which they recommend, an interesting pamphlet on the construction of standard car houses, another one dealing with fire doors and shutters, another on fire pumps, their construction and installation, another on hose, one on water pipes, and a very complete one describing the installation of automatic sprinklers. Besides these there is a pamphlet with which almost all of you are probably familiar, called the "National Electrical Code," which deals with electrical wiring installations and electrical fittings.

Most of these specifications were prepared by the National Fire Protection Association, but have been endorsed and adopted by the National Board of Fire Underwriters. The National Fire Protection Association is, by the way, an organization worthy of special commendation. Its objects are "to promote the science and improve the methods of fire protection and prevention, to obtain and circulate information on this subject and secure co-operation of its members in establishing proper safe-guards against loss of life and property by fire." It has no ulterior motive; it is simply striving to reduce the great waste by fires. The publicity work which it is doing is of inestimable value.

The underwriters are not obliged to bother themselves with these details, nor is there any law or moral obligation which demands this of them. They should, I think, be given due credit for their desire to improve conditions and reduce the number of fires. They could, of course, make their business just as profitable as it is at the present time by increasing their rates, without doing any of this expensive educational work, but they realize that this is not good business. They have seen the good results that accrue to public service corporations when they reduce their rates or when they perform a service from which the customer gets a large part of the benefit. We certainly should ascribe to the insurance people as much business foresight and ability as to the public service corporations.

There is, however, a feeling, in certain quarters at least, that the rates on some classes of risks are not as low as they ought to be. Comparatively little information is at hand to substantiate this claim, but the feeling is more or less prevalent that the rate makers in the insurance companies forget that the electric light and power interests have made wonderful strides in their modes of construction and operation. Time was when an electric light plant was put in "any old shack" that was available, and the poorly insulated wires were run in the most promiscuous manner in fire enticing wire towers, or else nailed up upon moisture absorbing wooden cleats in damp basements. The early experience of the underwriters in insuring undertakings of this nature was not at all pleasant, and they apparently have not forgotten these unprofitable risks of fifteen or twenty years ago.

A step in advance was made when a building devoted entirely to and designed for electric light plants was used, but this building was generally of cheap construction, oftentimes two or more stories in height and almost universally built with wooden floors which, soon becoming oil-soaked, provided a beautiful fuel when the building took fire.

The newer stations, however, are designed and built on entirely different principles, and the brick or tile walls, concrete floors, single large units, marble switchboards, wires run in conduit or raceways, together with protected iron columns, approved roof coverings, adequate water supply and constant and intelligent supervision,—all of these improved conditions reduce the hazard, and the owners are calling for and in many cases deserve greater recognition than is given by the underwriters.

That the rates on electric light and power stations are relatively higher than those on mercantile establishments is almost universally believed by the operators of these public service corporations. In other words, we are confident that the rates charged are not at all in proportion to the losses which have been sustained on risks of this class. The underwriters apparently can throw little light on the actual facts; at least, the information, if they have it, is not available for the general public.

I have been able, from various sources, however, to gather enough information to make me reasonably sure that our rates, on the average, are about twice as high as they should be.

I will simply present you one line of reasoning with which to verify the above statement.

McGraw's Central Station List gives, for the year 1907, a total generating capacity in electric light and power plants in the United States of 2,642,403 kw. and a total cost of these plants of $996,613,622, which is equivalent to $377 per kw. of station capacity.

A recent study of the Massachusetts Gas and Electric Light Commissioners' reports shows that the investments in generating plants and investments in outside construction—lines, transformers, meters, etc.—are about equal. That would mean $188 per kw. as the average investment in central station plants. Now deduct 10 per cent. for real estate and hydraulic developments, leaving $170 as insurable property. Most plants are insured, but allowing for those that are not and also for those that are not fully insured, we may be safe in using 75 per cent. of the $170, which is $127.50, or call it in round figures $125 per kw., which applied to 2,643,403 kw. means that the companies were paying premiums on $330,500,000 in that particular year, (1907).

The premium rate throughout the country varies greatly. We find some rates on buildings as low as twenty-five cents, while others run up to nearly $2.50; the rate on contents is always higher than the building rate. It is a conservative estimate, I believe, to place the rate at $1.00 per $100, or one per cent, for building and contents as the average paid throughout the United States. One per cent. on this valuation of $330,500,000 gives an annual premium of $3,305,000.

It is commonly conceded that the underwriters use 45 per cent. of the premiums for expenses of management, commission, profit, etc., which leaves 55 per cent. with which to pay losses. Fifty-five per cent. of $3,305,000 is $1,817,750.

Now the records show that the worst year that the underwriters ever had was 1909, when they paid out in losses on electric light and power plants some $619,000. Now compare, if you will, this figure—premium received and available for payment of losses, $1,817,500—with maximum annual loss on record, $619,000; the ratio is three to one. Now make some allowance for conflagration hazard, for inaccuracies in my figures here and there and reduce the estimate, if you see fit, by 33 1-3 per cent., and even then we are paying fully twice as much as we should for the insurance of our electric light and power plants.

Before closing this paper I cannot fail to take advantage of the opportunity to call to your attention the enormous loss, or waste, as it is more properly called, which is going on through fire each year. An instructive pamphlet bearing on this subject has recently been published by the United States Geological Survey. In this, statistics for the year 1907, and for the thirty-three years previous, are given. "The total loss from fire in the United States, during 1907, $215,084,709, represents a waste of nearly $600,000 for every day of the year, or $25,000 for every hour of the day. The term 'waste' is used because a fire loss is absolutely irretrievable and constitutes a tremendous drain upon the natural resources of the country. The insurance on a burned building does not bring back the property that was destroyed; it simply equalizes the loss between all others whose property is insured, and the money paid by the insurance company does not, by any means, cover the total losses sustained."

I called attention in the previous part of this paper to the danger of fire from conflagration or from exposure to other buildings. It has been estimated that this loss averages 27 per cent. of the total annual loss.

The value of brick, stone or concrete construction is well known to all of you, but the following figures may impress it upon your mind. During the year 1907, about $68,000,000 represented the loss in the United States on buildings of brick, stone, concrete and other slow-burning construction material, while double that amount, or $148,000,000, was on frame buildings. In European cities very few wooden buildings are allowed, and the tendency is toward building all structures of brick, steel or concrete. The electric light and power companies in this country, I think, realize the value of this type of construction, and most of the recent plants show that the companies are living up to their beliefs and are so building as to reduce the cost of insurance and at the same time lessen the likelihood of fire. Good construction is worth all that it costs, and nothing but the best of maintenance should be tolerated. Temporizing is an American sin, which we should get away from as fast as possible. Temporary wooden buildings, temporary wiring, temporary structures of any kind tend to encourage fires.

The designing engineer can and should correct many of the faults of construction. The operating engineer must largely confine his attentions to improvements in management. If both of these do their duty, reductions in fire losses will surely follow, and for this state of affairs we must diligently strive. When so much is being said about "conservation," the trained technical engineer should be among those to lead in preventing one of the most serious of economic wastes—loss by fire.

The great American bonfire continues to burn, but thanks to the foresight of the engineer and business judgment of the manager there are comparatively few electric light or power plants on the pyre.

The entire public, however, needs arousing on this subject, and I have not read a more severe arraignment of our wasteful method than that which appeared in a recent article in the *Midland Magazine*, written by Mr. A. F. Dean of Chicago, and in closing my paper I will give you his sarcastic and highly figurative language in the hope that it may stir you to better construction and greater care in operation:—

> "As our towns grew these balloon frames, so admirably adapted to the appetite of the Fire Fiend, were carelessly thrown together side by side in block after block, where they could be conveniently swallowed at a single gulp. Then we began to gather appetizing condiments for his fiendship, coal oil, gasoline, parlor matches, high inflammables and explosives, and the waste began. We have been shoveling single buildings down the gullet of the fire fiend every minute in the day for generations—shoveling with the regularity of a stoker shoveling coal into the furnace doors of an Atlantic liner. Every few days we have offered up at the shrine of our Fire God a town or two as a modest burnt offering, while as an annual festival we have sacrificed in his worship a minor city or two, and at intervals of about a decade we have paid special honors to our national deity by making a bonfire of

> one of our largest cities. Single buildings, blocks of buildings, in fact entire business districts have been burned and rebuilt over and over again, and it would be well within the bounds of truth to state that for every building now in existence in the United States, one or more of its ancestors, like Elijah, has gone up in a fiery chariot."

The President. Gentlemen, such a complete and comprehensive paper as this one deserves a great deal of commendation, and I hope it will be freely discussed in the short time we have to give to it. I am sorry I will have to limit the discussions to five minutes each. It is now half-past eleven o'clock, and this meeting will have to be closed very soon after twelve o'clock to give time for lunch.

The Chairman of the Committee on Nominations has asked me to have the other members of the committee meet in the registration room on this floor after this meeting. I will ask you all to be prompt in attendance at the afternoon session, not later than a quarter past two.

I want to announce also the desirability of getting your tickets for the banquet this evening. The tables will be limited to nine each, and it will be well for the members to arrange their grouping so that each member can have his friends with him.

Now we will go on with the discussion of this paper which has been so admirably presented by its author. I know of one or two gentlemen upon whom I would like to call, but I do not want to confine the consideration of this matter to them alone. There are a lot of young men here who very rarely have anything to say, and I want them to feel that they are just as much to be heard as the veterans, and hope that no one will hold back any questions or experiences. If anyone has any questions to put to the author of this paper let him not be afraid to ask them because I know he can answer them; I can assure you of it.

The first gentleman I will call upon is one whom we always like to hear from and who is always willing to say something to us, and he is Mr. Stetson of New Bedford.

Mr. George R. Stetson. Mr. Chairman and Gentlemen: You have cut the time for the consideration of the papers to five minutes each. It is very fortunate that the author has done about all the question answering in this line, so that perhaps five minutes will be sufficient for any of us.

I see but one thing which would lead to criticism, and that is that a gentleman of the business ability of the one who has addressed us should not be able to collect on a health insurance for a period of seven years. Perhaps he is building for himself on the modern requirements for safety from fire.

The matter of why we insure he has well considered and has pretty well elucidated the subject, but the only thing that any of us can hope to do is to illustrate and make more impressive the reasons "why we insure." The three reasons in my mind why we insure—and they come in sequence—are as follows:—

The first reason we insure is because we are a public service corporation, and we owe to the public our first efforts for regularity and continuity of our service. If any of us will examine our cities on a busy business night I think he will probably find that 50 per cent. or 60 per cent. of the money that goes into the hands of the merchants goes in on a Saturday night. Put in Friday, and I think you will be sure of it. Now, any interference with the service of our merchants on Saturday night can never be made up. I do not know where the money goes to, but if there is a loss to the mercantile business on these evenings it is never made up; it is the profit of that week's work as a usual thing, and cannot be caught up with. It is a loss like a fire loss—total. My experience tells me that our first obligation is to all those we are to serve. The whole life of that trade depends on the life of our stations, and it is something every thinking man has to consider.

After that comes our care of our stockholders. We ought to look secondarily, I think, to these. We insure so that they may be certain of their income and should be able to cover losses which might occur.

In the third place, we insure ourselves for our own benefit. That is, if you should allow your station to go uninsured and there should be a calamity in the matter of a fire, you certainly would be responsible to your stockholders and to the public and it would be a cause of change in management if such a thing were allowed to occur.

So there are three reasons in my mind, if they in any way enforce the reasons that have already been given, "why we should insure." We are very considerably indebted to the work done by the insurance companies. They have worked for our interest, as well as their own. The methods, as far as I know, of the New England Mutual Manufacturers' Insurance Company make an ideal method of insurance. In the first place, they require, (as has been suggested), that your buildings be properly constructed; and in the second place, they see that they are. They send inspectors and demand that if you stay in their family you shall do as they tell you. It is quite annoying to be ordered to do certain things in your own house, but when you come to think of it, that is the proper thing to do and you ought to thank the man who tells you to do it. In our station they required that we put in a large number of sprinklers, and we put them in. They have corrected or modified that now, they do not require that we should put our sprinklers over our machines, and over the switchboards, but they have taken other methods to cover that same matter. They required sprinklers to be put in the basement of our reconstructed station. But it can be and is a great deal better than it was originally. I think the idea was suggested by Mr. Blood, that generally the rate of insurance—I am not sure of this—is founded more on the condition of the construction of the older station of some years ago; and there is no doubt but that the rate under the conditions then ought to have been high. But there is scarcely a station in New England that has not been reconstructed. The boy has grown up, and with that growth has come to each of us a knowledge and realization of his responsibility. There were very few electric men twenty-five or thirty years ago. They were young men generally, and their work at that time was the extension of their business. That is what they thought of. Construction was not assigned to them as it is today.

Now, in the matter of how much to insure, how large an insurance you should carry, whether if you insure everything that should be insured there would be anything left to the stockholders. Start out with the necessary insurance. The laws of the Commonwealth make it obligatory to insure boilers, it is proper and it is strictly enforced. Really we all feel that that insurance is very largely compensated for by the scientific inspection which we receive. If it was not for that, I do not think we would insure. I tried several years to have my plant inspected by a competent man, but evidently that was poor policy, while I saved something in insurance.

Then the matter of flywheel insurance,—whether it is better to have that insurance or not. In my fifty years' experience I have not had one explode, but I have known several boilers in that time to explode. Then there is an insurance which comes very handy in case of accident,—the use and occupancy insurance. You can insure, of course, in that way. If there is any trouble in your station, you could have your insurance cover it for a certain amount of time that would necessarily be lost.

I think we cannot speak too highly of work and suggestions made by the different insurance corporations that have been so well described in the paper we have just heard read. There is very much better care of the up-keep of the station than there used to be. I think a very large percentage of the fires of the country are due to smokers. Anyone who has help that smokes in his station makes a mistake, but the biggest mistake is the smoking by the manager himself. "You may go into the boiler room and have a smoke of half an hour," you may say to your engineer or your man in charge, but discharge him if he smokes in the station. In this case, as in all others, prevention is a great deal better than any other kind of policy. The proper construction of your building is preventive; and now about the sprinkler, let me say that I had a station saved in one case by the sprinkler in the shaft room below. The oil in a shaft bearing clogged at night and took fire. The fire starting vigorously reached immediately from the bearing towards the sprinkler, which sprung and put the fire out. They do not do the wrong thing; if they get hot, they go off. Sometimes they do too much. It is not like one case in Fall River, where the man shut off the valve to the sprinkler and the mill burned.

It is a disgrace to this country, our six hundred million dollars of fire loss annually. That represents only the fire loss of structures. You double and quadruple that, if you add the forest fires. We will say 95 per cent. of them are careless fires, set either from setting a fire and cooking your food while in the forest, or from smoking, or something of that kind, and when you get this up to a million dollar loss a day, we are consuming a very large part of the profits of the business of the nation. The only cheerful side in the matter of the scarcity of lumber, (for we are approaching a time when we cannot use any more of it), is that we cannot have our buildings made of lumber We had a large frame house in our town take fire recently and in eighteen minutes that building was entirely destroyed. If it had not been that proper precautions were taken, several houses would have been burned. In my vicinity we have been saved three conflagrations; twice on account of the wind blowing toward the water, and another time on account of snow covering the houses. A few weeks ago we had a case where the cotton took fire in a storehouse, it set fire to the grass nearly a mile away and if the wind had been the other way we would have had a severe fire. I have been told in France if a fire starts in your house, or wherever it starts, the man who owns the property does not get any insurance, and that it is considered a crime, and yet our fire loss is probably greater than that of all the civilized nations on the earth put together,—Germany, France, and England. And you might add something more, and that is, owing to their methods of construction and more thoughtful care.

I think the paper that has just been read is one which will be of infinite use in its references, not only in the suggestions made but in the actual facts presented, and I hope we will all go home and do something to clean up.

THE PRESIDENT. Mr. Mackinney of Providence; we would like to hear a word from him.

MR. MACKINNEY. Mr. President and Gentlemen: As part of my duty is the prevention of fire in electrical property, Mr. Blood's paper has been of very great interest to me. My superior, Mr. Lisle, asked what I thought of it, and I told him that Mr. Blood had my ideas and expressed them better than I could. He covered very thoroughly a very broad subject, and I should like, not to criticize, but to re-enforce some of his remarks. He makes a suggestion about the original designing of electrical properties. This is very important, and although he has expressed it very well, I should like, if possible, to further impress upon such number of you as have to do with the original designing of these properties the necessity of looking ahead when the original plans are drawn. When the original scheming of a new plant or the addition to an old plant is going on, a fire protection engineer should be called in. You are very fortunate in New England in having very good men in this work, and their services can always be had for the asking. They are not practical electrical engineers or electric light men, but their advice and suggestions are sometimes of the greatest value to the designing engineer. They go to a different building almost every day, and look at them from the standpoint of the insurance man. They see different problems to solve every day and are investigating fires constantly, and know where to look for the probable start. I can say that if you gentlemen would confer with them oftener and knew them better, some of you would get over the prejudice you have against an insurance inspector and a fire protection engineer, and I think great good would come to the electric lighting man and also the underwriter. I am sure you would find them a very practical and get-at-able lot of men.

Mr. Blood gives some very good advice about care and management, or rather, the lack of it. He calls it carelessness. Sometimes it is referred to as bad housekeeeping. It would seem a simple thing to keep a piece of property of any sort clean and in good order, but I have found in practice that it is a very difficult thing to do. It is very difficult to make personally the rounds of a plant, and to keep it in first-class, cleanly condition. The reason for this is that it is more or less constant work, although if done properly it is light work and does not take very much time.

Another reason is that oftentimes the men who actually do the cleaning do not know what cleanliness is. One other reason—I am afraid that I may hit somebody—is that even the men in executive positions, and in the position of "boss" around some of the plants, think that the matter of cleanliness is beneath their notice. I have found several stations,—where the man says, "I am not a cleaner. Let the man attend to it who sweeps up." Now, if the man in charge looks at this most important subject in the light in which he should look at it, instead of in a flippant sort of way, much good will result. But if a contrary course is followed, the result will be that you will not only have an uncleanly, slovenly place from the standpoint of the insurance inspector, but the force will also get careless in some other department of this work, concerning which you know more than a fire protection engineer.

The station that is designed along the lines laid down by Mr. Blood is quite easy to keep in good condition, with good housekeeping. In some cases it is much more difficult. In most cases personnel will have to be kept up to the mark.

It is a very, very important phase, I know, and Mr. Blood mentioned it and characterized it as one of the many points he made. As it is a most important thing that electrical properties be kept scrupulously clean, definite and simple rules should be made. There should be no useless or unused articles allowed on the premises. That is a simple rule and if it is followed the station, as a whole, will be kept in good condition from the one standpoint of cleanliness.

Another great assistance in keeping this one item up is to insist on constant inspection. I will state that most of the general managers of the stations that I am familiar with are beginning to look with favor on regular inspection. A general manager said to me three or four years ago "How long is it since the insurance people inspected station No. 1?" I said, "About six months ago," and gave the name of the inspector. He said, "Now, the insurance people send me their policies and their bill with great regularity. They never forget it. I am not going to allow them to forget to send their inspectors. Their inspection reports must come to me quarterly, and I consider them of just as much importance as I do the policy."

I thank you, gentlemen. (Applause.)

THE PRESIDENT. I know of one more gentleman upon whom I wish to call, but before doing that I should like to have some questions asked in regard to the paper. I have not heard anyone ask any questions. If the central station men are here to ask questions I wish they would do so.

MR. H. S. KNOWLTON. I would like to ask Mr. Blood why an electrically lighted building was not included in the specifications of an ideal risk, in view of the superiority of electricity in comparison with gas?

MR. BLOOD. They were made 13 or 14 years ago, when electricity for lighting was not so universally used as it is now and the underwriters thought gas much safer. Today they would say light with gas or with electricity when installed according to the National Electrical Code, and as a matter of fact, that is their interpretation of the standard today.

The President. Is there any other gentleman who would like to ask any questions? If not, I would like to call on a gentleman whom all of you know, who has been connected with the electric lighting business for many years as consulting engineer, etc.,—Captain William Brophy of Boston. (Applause.)

Captain Brophy. I came here to listen and not to take part in the discussion of the valuable paper just read. I have been so long a stranger to gatherings of this kind that I almost need an introduction to all those here assembled, for, owing to circumstances beyond my control, I have not been as faithful in my attendance at the conventions of the Association as I should be and as I was for a good many years.

I have had a somewhat extended experience in the matter of fire insurance of electric light and power stations and the relations that have existed between the fire underwriters and those engaged in the electric light, power and street railway business. When I began my career as an electric inspector the business of electric lighting was looked upon by most of the fire underwriters with anything but favor. Many felt that the extra hazard due to the introduction of electric lighting in buildings would increase the fire loss so much that insurance companies could not afford to carry such risks at any rate of premium that the public could afford to pay. For a long time it was hard work to convince them to the contrary, but the progressive element were willing to co-operate with those engaged in the electric lighting business and the combined efforts of both has resulted gradually in the happy state of affairs existing today. The early experience of the fire underwriters in the insurance of electric light stations was anything but satisfactory. At that time any old shed was considered in some sections as good enough to hold the apparatus for an electric lighting plant, and in many of them cleanliness and order were things unknown and in others rarely practiced. As a result, in nearly all cases where fire occurred the underwriters met with a total loss, either by fire or water, or by both combined. At one time after what looked like a serious loss on an electric light station the cancellation of all policies on electric lighting stations was seriously considered, but I knew the loss was not nearly as great as it appeared to be; the owners of the plant (and it was a large one) were reasonable men; desired only a reasonable settlement, because they knew the prejudice against that kind of property in the minds of many fire underwriters, (some companies refusing to take such risks), and they desired to remove such a feeling if possible. The loss proved to be only a fraction of what it appeared to be, all were satisfied with the settlement and outstanding policies were not cancelled as proposed. Since that time there has been a steady improvement in the character of electric light stations and a corresponding decrease in premium rates, and a properly constructed station, properly cared for and well protected is considered a most desirable risk. If in many cases the rates are high it is for the reason that there are defects that increase the fire hazard and when they are removed the rates will come nearer to what the owners deem reasonable, for it is manifestly unfair to make the same rate for a first-class station, made as nearly perfect as can be from an insurance standpoint, as for one having glaring defects that add greatly to the fire hazard and vice versa.

To my mind the ideal method of fire insurance is that adopted by the Factory Mutual Insurance Companies of New England. They set a certain standard for the construction of the buildings they insure; the manner in which they shall be protected from fire and no very great deviation from such standard is permitted; all must be of slow burning construction; must not be exposed to outside hazards which would endanger them; must be kept clean and neat and under the watchful care of someone at all times. The buildings they insure were at one time considered the most hazardous and inflammable, mainly textile manufactories, paper and woolen mills. I can remember the time when these establishments could not secure fire insurance at any cost that they could afford to pay, and as a result they, the manufacturers, were obliged to insure themselves, and that was the beginning of mutual fire insurance in New England. Today the average base rate of premium paid on these hazardous risks is one per cent.; the policies are written for one year only; at the end of the year the losses by fire (if any), the cost of inspection and all other expenses of transacting the business are deducted from the gross amount of premiums received and the balance is returned to the insured, and that balance ranges to from 50 to 90 per cent. of the premium paid. That shows what good construction, care, rigid inspection and ample protection will accomplish. An electric light and power station properly constructed, protected and cared for is not nearly as hazardous as a cotton, woolen, paper or rubber factory, and the rate of premium paid thereon should be no greater. Build your stations of slow burning material and watch over them with the same degree of care as if you carried no insurance and your premium rates will be the lowest possible, whether you insure in mutual or stock companies. We hear much said of fireproof construction. There is no such thing as a fireproof building. I can recall but one that ever existed in the City of Boston. Years ago it stood on Beacon Hill; it was built of stone and was filled with water—it was a reservoir.

One of the misfortunes of this country has been that it has had an abundance of cheap but inflammable building material furnished by the vast forests which in the past covered a great amount of our territory, and owing to its abundance and cheapness it has been used to a greater extent here than in any of the older European countries. We wonder at the great difference in the fire losses as between those countries and this; we wonder why our loss from this cause cannot be reduced to the same figures as is obtained there, but we forget that wood is but a small item in the construction of buildings there, and while it is the cheapest material used here it is the most expensive there and that is the cause for its limited use, and also the cause of the small annual fire loss as compared to ours. The time is coming when our great forests will disappear, and then wood will be too expensive for building material. Mr. Stetson deplores the fact that our forests are disappearing, but when that time comes, when lumber will be as scarce here, as in Europe, we will have a better class of buildings, fewer fires and lower rates of insurance. It is a great mistake for an electric lighting company to rely wholly on its insurance policy to reimburse it for loss by fire, for in the first place the building is never insured for its full value, and in the next place it does not cover the loss due to the interruption of business, and it does not restore the loss of confidence in the minds of the customers in the stability of that business. You are supposed to furnish electric energy three hundred and sixty-five days in the year and every hour in each day, and you should see to it that such service is not interrupted by the partial or total destruction of your plant if human care and forethought can prevent it. I can recall the time when the man who equipped his building for electric lights would not think of dispensing with gas or his gas fixtures, because he had no faith in the ability of the electric light company to give him light at all times, and the electric light managers themselves advised their customers to retain their gas fixtures to provide against the possible failure of the electric lighting service, but all that has long since passed and the electric lighting service is now as reliable as that of gas. Once more let me say, build your stations of slow burning material; keep them scrupulously clean and neat; do not allow the accumulation of dirt, oily waste and rubbish in any place; equip your basements, stock, store rooms, workshops and attics (if you have any, better not have them), with automatic sprinkers and furnish them with a never-failing supply of water, have such other fire extinguishing appliances as are deemed necessary and teach your men the use of the same; watch over the stations with the same degree of care as you would if you carried no insurance; do not use your basements, attics and other out-of-the-way places for the storage of odds and ends or rubbish of any kind, compel your employees to do their smoking before and after working hours, and you can take my word for it that the best and strongest insurance companies will be competing for your business and at rates that will be both reasonable and satisfactory. For you, gentlemen, can bring about a reduction in insurance premiums in less time than it can be done by any local, state, or national board of underwriters if you so desire. Those who do not build and maintain their stations according to the dictates of common sense and prudence must pay the penalty for their short comings in increased rates of insurance and they have no right to raise the cry of extortion against the fire insurance companies.

Mr. Blood. I certainly agree with Captain Brophy that careless smoking in and around power houses is a great menace. With reference to fire losses in this country as compared with others, I may say that the admirable Bulletin No. 418, published by the U. S. Geological Survey is well worthy of your attention, and I advise everyone here to read it. It shows that we are paying just about five times as much in his country in fire losses as is paid in any of the European countries.

Before you go from this meeting, there are just two things which I wish to impress upon you and to have you carry away with you as the result of having heard this paper.

First, you should bear in mind the desirability of building your properties right, of keeping them in clean and neat condition, and of operating them so as to reduce the chance of fire to a minimum. You have been doing this and I ask you to keep it up and do better than you have ever done before.

The other point that I wish you to carry with you is that you are paying too much for your insurance, and it is up to you to let your insurance agents and the brokers through whom you do business know of it and insist upon their getting the rates down.

As I brought out in my paper, we are, I feel sure, paying fully twice as much for our insurance, as a whole, as we should. Backing up the figures which I presented to you, I have learned during the last sixty days of the actual experience which two insurance companies have had over a term of years in writing electric light and power stations. Instead of paying out 55 per cent. of their premiums in losses and commissions, one company paid out approximately 15 per cent., and the other company, 20 per cent. I simply ask that, when you go home, you get busy with your insurance agent and see if you cannot get your rates of premium down.

Mr. Fleet. I would ask whether it is considered a greater risk on buildings if lighted by gas than if lighted by electricity.

Mr. Blood. I thought I answered that. According to the rules of the National Electrical Code, there is no discrimination in either case made by the underwriters.

(Recess till 2 P. M.)

AFTERNOON SESSION.

The President. Before the paper for discussion this afternoon is read, I want to make a few announcements.

Perhaps you have seen in the morning paper an article regarding the erection in Boston of a new club house. A movement has been taken up within a very few weeks to consider the feasibility of erecting a large building or home for engineering and scientific societies in Boston. As you probably well know, there are quite a number of these societies. Many of the members here are also members of these societies, and as the matter now stands there is not any one headquarters or any building where we can meet; and with an Association, growing as ours is, it will become a serious proposition before long where we can get accommodations in Boston. There have already been two or three meetings held and committees have been appointed to look into the subject further. I want to bring the matter to your attention this afternoon and to see if you are interested in the project. In order that you may get the most information I have asked a gentleman who is foremost in this movement, a gentleman with whom most of you are acquainted, to speak upon it. I will introduce to you Prof. Ira N. Hollis of Harvard University, who will address you on this subject.

PROF. IRA N. HOLLIS.

Gentlemen: I consider it a great privilege to be allowed to come in here and say a few words on this subject and explain to this Association just what has been done here during the past few weeks. In January, on the 21st, we had a dinner at the Somerset, when a resolution was passed by about 400 engineers, representing all the engineering societies of the city, that an inquiry should be made through the various societies as to the demand for a common meeting place. I wrote a letter that went out to the presidents of the various societies in this community, asking for the definite appointment of representatives to meet at some time soon to consider whether the engineering societies in Boston would like to have a building where their rooms would be located, or a settled office representing each one, and an auditorium for a common meeting place, as well as an engineering club. In response to these letters there came to the meeting about two weeks ago representatives from the Boston Society of

Civil Engineers, which I name first as the society which has been studying this question for twenty years, the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the New England Water Works Association, the New England Association of Gas Engineers, the Telephone Society of New England, the New England Section of the National Electric Light Association, the Boston Chapter of the American Institute of Architects, and the Society of Illuminating Engineers. Several of them have written that they would join with us in the course of time. The list contains a committee of fifteen, appointed at the first meeting, where the project was outlined. I think there were four projects, but the one which we considered well worthy of further investigation was to put up a modern fire-proof structure in the vicinity of Copley Square, or perhaps a little further down town; a building meeting the requirements of these societies, similar to the building in New York, for the engineering societies.

By having a joint library, a very small sum will be required from each society to employ a librarian and there will be a social or lounging room or other apartments adjoining these rooms on the top story.

There will be a large auditorium located in the same building or immediately adjoining it, and connecting with it a first-class club, with, we hope, about one thousand resident members, and perhaps a thousand non-resident members. The New York Club has double these memberships. The club and society building would be connected so that there may be a large banquet room in the club, also available for an auditorium. Such portions of the building as are not used by the club and by engineering societies would be used for commercial purposes; for instance, rented by members of the engineering or architectural professions and others.

The cost of a building of that kind is a matter that has been studied a great deal. It seems to the committee that if we are going into it for the sake of the engineers in New

England, it must be on a scale sufficient to give the whole profession here a dignity that is worthy of it. A building something like that in New York, including the site, would cost a million and a half dollars. If they figure the interest on the investment, etc., and find that it probably can be carried by the engineers of this region—especially if the lower part of the building can be rented, the total amount necessary to take care of the project, including interest, would be between $120,000 and $200,000 a year, and that has been apportioned in such a way as to give us the assurance that it can be carried. Furthermore, we have found an unexpected interest in this subject on the part of business men in this community. We have had an offer, for instance, for simply the lower floor, so that we can have the ground for ninety-nine years, free of rent and taxes, and we can get one-half the million and a half immediately. Whether it can be carried out in its entirety or not we do not know, but we have begun on a sufficient scale to be able to lop off half of it.

There is one thing about this, gentlemen, that has appealed to the community, and I feel that I shall not take your time in vain by saying just a word or two on that subject. We know in the community, as you know, that during the past twenty years, or at least, the past dozen years, the methods of manufacturing and the methods that prevail in engineering have been completely revolutionized even to little things. My attention was called to one very small thing by ex-President Eliot ,when he said to me: "Did you realize that the engineers completely revolutionized fishing on the New England coast?" It is true, when you come to consider the little gasoline motor, that it has completely revolutionized the fishing on the New England coast. That is something in which New England has taken great pride. We also realize that the position of the engineer has been completely changed in twenty years and he is now taking his place alongside of men in other professions. My attention was called to that also by President Eliot, in connection with a town in Virginia, where it had been decided to run the town by a business manager, and as the best kind of business manager they had selected an engineer. I think that notion prevails all over this country, and it only remains for the engineers in this community to join in some great centre worthy of the engineering profession to have definite recognition from the entire New England region in the final adoption of the engineer as a professional man equal to the man in law, medicine or any school. The one thing that the committee would like, and the various societies with which they have talked on this subject would like, is the support of the engineers.

I know perfectly well, as many of you know, that, as in every profession, there are some men better able to join a club of engineers than others; but we hope by having large numbers to put the dues in such a club down to the point which will reach the line pretty well down on the scale of salaries, so that almost all engineers who want to meet others frequently may have a home.

Regarding a meeting place for the societies, we all know the necessity for that. During the past year or so the American Society of Mechanical Engineers have had meetings in Boston, and also the American Institute of Electrical Engineers, and while both are national societies we have had to beg meeting places from month to month, so we have gone about here and there asking for a hall with a seating capacity of three or four hundred men in order to have the regular monthly meetings. We hope the time will come within a few years when we shall have our own meeting places, where we can hope to meet you.

Another thing which came up in the past year and which I have looked upon with a great deal of interest is the possibility of holding out the hope of not only meeting some individual societies every month, but also the bodies of engineers. We have now in prospect for the rest of this spring, and probably for next year, what are called meetings of engineers, in which the American Institute of Electrical Engineers and the American Society of Mechanical Engineers, as well as the Boston Society of Civil Engineers, all join.

This enables us to get large meetings without forcing every society to prepare a monthly paper. I hope some day, by this association, we can get papers of much larger calibre for all engineers and in that way get very much closer together. The one thing that has made the building possible—I feel like suggesting that because it may help to bring this society into more intimate contact with other societies—is that we have decided on a plan of meeting like this: A meeting is called by, say, the American Society of Mechanical Engineers on the 22nd of April. The meeting will be conducted by that society, which will be responsible for a paper and for a discussion, but the other societies will co-operate in this meeting, will have full access to the papers and will have the use of them for publication if they wish. In May, exactly the same thing will be done, when Mr. Stillman, President of the American Institute of Electrical Engineers, will come to Boston, to address the Institute, except they will then hold a meeting conducted by the American Institute, with the co-operation of the American Society of Mechanical Engineers and the Boston Society of Civil Engineers, thus bringing the three societies very intimately together. I look upon that as one of the best things that has happened to the American Society of Mechanical Engineers in recent years, that outgrowth of the Boston meeting; and I only hope that the club house and that building where all engineers' societies in this community can meet will serve to bring all engineers' societies together and thus give every individual in engineering field the strength of all the societies.

You will receive our circular, gentlemen, in the course of a few weeks, and my statement is simply preliminary, to assist in making clear to you what this proposition is. I can only thank your President for the opportunity of saying a few words on the subject, and express regret that I cannot stay here this afternoon to listen to the interesting discussion that you will doubtless have later. I thank you very much. (Applause.)

The President. Gentlemen, Prof. Hollis has told you what it is hoped may be accomplished. Will some one offer a resolution as to what this Association shall do in the matter.

Mr. Sands. In view of the statement that has been made, and of the state of affairs regarding this matter, I would move that the subject be left in the hands of the Executive Committee of the Association.

(The motion was adopted.)

The President. The same interest is being taken now in the advancement of our Association as was the case before this meeting. Our registration thus far is in excess of 300. I may say that our officers expect the Association will have more than 600 on its membership rolls, at the end of this convention, which, considering that we are a one-year-old body, shows the tremendous interest that has been taken in the Association, and it is well to know, as Professor Hollis has said, that it will not be long before we shall need to have a meeting place of our own. I hope we shall reach a membership of 1,000 before another year.

As one of our guests this afternoon, we have a gentleman here who has come several hundred miles to meet you, a gentleman whom many of you know and have seen before,—in fact, he came to our semi-annual meeting which was held at Portsmouth, in September, of last year,—and he wants to say a few words to you today as to what the National Electric Life Association is doing. Therefore, it gives me great pleasure, gentlemen, to introduce to you President Frueauff of the National Electric Light Association. (Applause.)

REMARKS OF THE NATIONAL PRESIDENT.

Gentlemen: I believe you will all be interested in hearing at the outset something of the plans of the National Association for the next few months, and at the risk of possibly repeating some things which may have been said by Mr. Martin, yesterday, I will proceed.

The Executive Committee have approved the plan of having the next annual convention of the Association in St. Louis, during the week of May 23d, the meeting to be held in the new Coliseum. We believe this will be the most satisfactory meeting place the Association has ever had. The Coliseum is a well built concrete structure, erected about three years ago, and has all the arrangements for exhibitors as well as a good meeting hall for the business sections. It is our plan to have as many as three sections running simultaneouly in order to cover the work which has been laid out by the Papers Committee and for the discussion of central station work. We shall have one or two general sessions, and after that an Accounting Section, a Technical Section and a Commercial Section, and also a new departure this year, a Power Section. The Accounting Section will arrange the various forms in use all over the country. The committee have at work in New York a number of persons tabulating these forms. Many of these national associations have uniform forms of accounting which have been considered satisfactory. There seems to be wide difference in the forms used throughout the country, and the working committee is busy in an effort to standardize them. The Commercial Committee are planning to do even greater things this year. The committee has been hard at work all the year, arranging a program that is going to touch pretty generally on all the live commercial features, so prominent throughout the country today. The technical papers are being prepared with a great deal of care. The new section, the Power Section, is designed to embrace largely the water power or hydro-electric development throughout the country. A great many features have come up in that development in the last few years that would seem to be deserving of discussion in open convention. A number of the engineers have considered that it would be wise to come together and get some degree of benefit from these ideas. The committee are arranging a few papers, and it is believed that with these there will be a very general discussion of the problems which the large power plants have to solve.

The exhibition ought to be more attractive than ever before; and we believe we are going to St. Louis, early enough in the summer, so that all the visitors will be sure of good weather. I will not make any special mention of the entertainment features, because there is a special committee having that in charge, other than to say that the visitors will be entertained well in St. Louis. The committee that extended the invitation to us is made up as a League of Electrical Interests. The supply men believe that the get-together habit is a good one to have there. The invitation to hold the annual gathering in St. Louis came from that body. They have promised to look after the welfare of the delegates in attendance, and I feel sure from the hospitable reception that the officers of the Association accorded us when they asked us to go there that all the membership will enjoy the convention.

This gathering will mark the twenty-fifth anniversary of the formation of the National Association, and we are hoping and planning in some of our features to make a memorable event of this meeting. The central station industry has practically been created in the last twenty-five years, and when we realize the progress that has been made we may well congratulate ourselves that we are in the central station business. We cannot look around us and see any other business that has made the strides we have made in that quarter of a century. We believe the convention will attract the attention of the whole country. The press bureau in their efforts to popularize the convention will do their utmost, and they are an enterprising lot of men. I might also make some special mention of the work done by several of the special committees which will present their reports at the annual meeting. One committee, which was known this year as the Committee on the Preservation and Treatment of Poles and Cross arms, will have an attractive report to make. The committee in charge has made visits to a number of testing plants where experimental work is carried on, and its report will be interesting to all the sections interested in timber.

Our Question Box this year, as many of you know, has been handled by Mr. Parker of the Rochester Company, and is being treated in a wonderfully satisfactory way. The Question Box will be as interesting as ever before. I visited Rochester and saw there the mass of matter going through the hands of Mr. Parker and the questions received and replied to, printed and duplicated. The Meter Committee, which a year ago made an exhibit which was one of the features of the convention, have had an opportunity for further research this year, and they will make an instructive report. The members of the committee who have been left in charge of these matters this year have met with wonderful encouragement from all the Class D membership, everything being volunteered, the idea being to have all the information up to date and as accurate as possible.

The Committee on Terminology, which I mentioned last fall, has been doing a lot of good work, and their report, which will be presented at the May meeting, is going to be beneficial, for we have had the advice of some of the most able men in the industry and we have every evidence that many of these terms will take their place in the language and will be standard, and thus save much trouble and misunderstanding in the profession.

The Public Policy Committee has had a number of meetings and will have three or four more before the National meeting. Their report is going to be delightful, and we shall all want to use the information they will give us.

The efforts that the New England Association has made, I want to say, are more than gratifying to the National Association. We wish that the other sections could show such a growth. Our officers constantly refer to the splendid organization and progress made by the New England Section.

Mr. Martin, who is sitting on my right, has been a great aid; I will not hesitate to say what an invariably helpful assistant to the Association he has been. New work is coming up in the new associations, and as soon a something novel has been suggested it has been taken up by Mr. Martin and wrought out successfully. The committee work is heavier than it ever has been and more plans have been laid and more accomplished than in any one year, and with a permanent secretary the association will go ahead at a more rapid rate. The membership committee have been gathered this year from all over the country. We have added to the growth of membership, and that, I take it, is a very great evidence of the good we have done.

Some of the membership of the Association have been more or less criticised in the controversy that is pending in Washington, over the conservation of the national resources, and we feel that it is proper that another side of that discussion be put before the public, and one feature of the national gathering will be some statement of what the water power companies are actually doing for the public. We have a right to have a hearing to set ourselves right in the public eye.

In closing I want to make one more point, as to whether or not it is advisable for the members of the local sections to attend the National Convention. I may be extreme in my views, that a man who can go to a meeting of a state section can also tremendously increase his work and knowledge by going to the national gathering. Just as you gather information from this meeting and meetings in your own locality, so you can gather it by going to meetings held in another part of the country. The central station man is handicapped in a way if he does not get out and attend conventions as do men in other lines. Grocers, doctors and lawyers can get together and exchange view points and can most readily do this at conventions.

I want to thank you for the opportunity of coming here today and meeting with the New England Section, and also to thank you for the progress made for the National Association in the growth and expansion of the New England Section. (Applause.)

The President. President Frueauff has truly said that the New England Section has been quite lively the present year. Of course, we have obtained our gait from the pace set by the National Association, but if the management of that association don't look out, they will be following us and not leading. (Laughter.)

I know that you would all be disappointed if you did not again hear from the other representative of the management of the National Association, who is with us this afternoon. Mr. T. C. Martin, the Secretary of the National Electric Light Association, was here and addressed us yesterday, but as you were not all here then, we would esteem it a pleasure to hear from him again. It gives me great pleasure, gentlemen, to introduce to you Mr. T. Commerford Martin, Secretary of the National Electric Light Association.

MR. T. COMMERFORD MARTIN.

This is an unexpected honor and pleasure, I can assure you. I got my little speech off yesterday.

President Frueauff has covered so many points of our active work that there is very little left for me to add. He passed me out a very handsome compliment and I would like to hand one back. It really is inspiring to work alongside that vigorous, lively young man from the west. I thought I had pretty well used up all my energy in editing the old *Electrical World*, for some thirty years, but when I passed into the sphere of influence of my esteemed young friend on the left I found there was still a great deal to live for and work for, particularly in promoting the interests of the central station man and the National Association. I think it is the happiest augury of the future of the National Electric Light Association and of the industry that it can give careers to such men and that they can make themselves felt very decidedly, not as an influence coming from the chief officers or the executive, not only from the ranks of the old men and bald heads, but from the ranks of the juniors. The position of veteranship was reserved for the Executive Secretary. (Laughter.)

With regard to the membership, it is true that the New England Section is growing rapidly, but unless it grows at a much more rapid pace than it has of late it will not be able to keep up with the ratio of increase now maintained at headquarters and throughout the country. It is true we are using your example over the different parts of the country, but if I am to judge of the news that reaches me we shall have a very large and rapid growth elsewhere, west and south, and whatsoever the causes, unless you have more than a thousand in the membership this year, I am afraid you will be dropping very seriously to the rear. When I went into office there were 3200 members in the Association and today we number over 4800, being a gain of 1600, in the five months; and a member of the Membership Committee, who has not had an opportunity to cool off, believes that by the time we reach the annual meeting at St. Louis we shall be 6000 strong.

I think it is remarkable evidence of a bright future of prosperity to the central station industry, that we shall have reached a total of that number when we celebrate our twenty-fifth anniversary. It does not seem to be looking forward in a spirit too sanguine to expect that within a couple of years we shall have a membership of not less than ten thousand, and one of the reasons for it is that which distinguishes ours from almost any other industry in the world, if not indeed from every other, that the industry itself has doubled its totals from year to year. So when I was given the opportunity to become the Executive Secretary of the Association I knew I had a great opportunity waiting for me, and I think a large part of our recent gain in membership is due to the fact of people hearing on the street the degree of our success and influence over the art as a whole.

I could quote by the hour instances in which the National Electric Light Association is a benefit to the smaller associations; and if there is any gentleman here representing a smaller company—I mean a company of a capacity to serve a population below twenty-five thousand—I simply want to make it my most earnest plea and recommendation that he enroll himself into our membership at once. The larger electric light company has, in a sense, little to reckon on from the National Electric Light Association in the way of direct service. Take, for example, the magnificent organization of the Boston Edison Company—the talent in every branch of it. It is not possible for a small company to command within its own ranks such service. There is not a small company in the country that can command the best talent and ability; and yet you will see that we have in our National Committees from 100 to 150 of the very best men, men of the best minds, men of the greatest technical skill, men, many of them of national reputation outside of our own field, and the work of these men is at the command of the small central stations through association with this body.

I receive anywhere from 75 to 100 applications for information every month, men wanting information, men wanting guidance as to how they can combat certain attacks and certain adverse, insidious influences that are being exerted against them. In many instances these questions go to the Question Box and are there answered. These questions are often of vital influence, and the answers to them will often save the companies both time and money and the members will save their dues for the year a hundred times over through the receipt of this information. I can name off-hand two cases which have occurred within the past month. In one case a small town in Texas had enacted an ordinance in relation to electric signs over buildings, and there was an attempt made to enforce an entirely unreasonable law. The result was that from the information which was supplied them the electric light people were at length allowed to proceed with their work. In another case, in the New England states, a question arose in regard to the overhead circuits, and the local company received advice which saved them many thousands of dollars. The problems offered for solution in both these cases could not have been settled except through the agency provided by the National Electric Light Association. I am simply throwing this out for your guidance.

We want to reach the smaller central station man, not for our good, but for his good. This Association today represents about ninety per cent. of the capital and savings in the business throughout the country. We have a membership of some eight hundred companies, leaving about four thousand companies still out of membership. They represent about ten per cent. of the business. Now, they can add very little indeed to our income or to your income, and they add little, if anything, to the influence exerted on public opinion; but they can do themselves an incalculable amount of good by coming into association with us and thus augmenting their own influence.

Mr. Frueauff has indicated the cost of getting additional strength in the Association. It was pointed out that it was not to be considered a mere membership campaign that we were in, that we were not glorying in what had been done as to numbers, but the key note of our campaign should be that we are working for the organization of the industry and for the best interests of all. Let no man representing a small industry regard this movement as a selfish one, but let all welcome this opportunity of sharing in the work of these two great representative bodies. (Applause.)

THE PRESIDENT. I hope if there are any representatives of the smaller electric lighting companies here they will take note of the words we have just heard from the Secretary of the National Association and make every effort to get their friends from the smaller companies into this Association.

The next on the program is a paper well worth your consideration and discussion, and I would like to ask those members who intend to take part in the discussion to please give their names as they rise to speak, and to speak as clearly as possible, so that the stenographer may be able to take the notes. These notes are to be printed, and the transcripts of remarks will be sent to the authors, so that they may be corrected and returned to the Secretary. I will ask you to be as prompt as possible in returning the reports so that they may be included in the publication of the proceedings of this meeting.

This important paper we are about to listen to, upon "Increasing the Loads," by Mr. E. R. Davenport of the Narragansett Electric Lighting Company of Providence, is one that is of interest to every person here present. I know that the discussion will be very profitable and ought to be as interesting as the paper itself. Gentlemen, it gives me great pleasure, therefore, to introduce to you Mr. E. R. Davenport of the Narragansett Electric Lighting Company of Providence, R. I.

INCREASING THE LOAD ON EXISTING LINES.

E. R. Davenport.

In presenting this paper at the request of your Committee on Papers, I realize that it would be very difficult to bring any matters to your attention that have not already been covered, either at conventions or in the trade papers, but believe that the sales methods in Providence would be interesting.

Power Sales Methods

Many Central Station men are apparently inclined to feel that it is out of the question for them to attempt to go into the finer points of power sales engineering in order to secure power business. In our own case we found it advisable to do this engineering, and have developed a system for handling power business which we believe is second to none in its thoroughness and efficiency.

The organization may be too ambitious for a small city, nevertheless a study of the methods should have some value to every power salesman. The matter of approaching a prospect and the method of preparing and presenting the report may well be adopted in spirit, and modified to suit the conditions in any town or city. It is largely a matter of mental attitude, a willingness to prove the case and the ability to investigate and report exact conditions in detail and draw the deadly parallel. It is the ideas behind the system that have made it successful and these same methods can be utilized in part and in principle wherever there is power business awaiting conversion.

In the Power Bureau there are three competent engineers and four assistants, all technical graduates, and capable as a body of handling the most complex power problem. The engineers are detailed by the General Power Engineer to each prospect, and the matter is in the hands of one man with such help, of course, as is necessary, until the installation is made. Some of our men have had special experience in certain lines of work, and this knowledge is naturally utilized to the fullest extent.

We advertise the free services of our engineers, and when a prospect is encountered, who resists the ordinary sales effort, we offer to make a study of his plant, analyze his power conditions, and submit a detailed report. We feature this free engineering very strongly and stake our reputation on the accuracy and fairness of every report. To accentuate this, we always express a willingness to have the proposition referred to any consulting engineer in the city.

In each case, we make a careful study of power conditions in relation to a possible improvement in efficiency and output, our report covering every detail specifically. As a result, we have found that often times in the case of new buildings, it is only necessary to submit to the prospect engineering data, drawings, and blue-prints, which were prepared for some other installation, to have them accepted as ample proof of our ability to make good. Several contracts for new buildings have been secured in this way without further effort. After an installation is completed, we test each motor under normal running conditions, and if it is found that any changes in motor sizes would benefit the operation or efficiency of the plant, these changes are made without expense to the consumer, as full allowance is made for the motor returned.

The first month's bill on every installation is referred to the Power Bureau for approval, and is never sent to the customer until it has been compared with our estimate. If we find that there is a discrepancy between the bill and the estimated cost as submitted in our proposition, the bill is held up and an immediate investigation is made by the engineer who developed the installation. If he is busy on new work, it is simply dropped until the matter is straightened out, as it is an inflexible rule of the department that the needs of present customers take precedence over all prospective or impending business. We not only approve the first month's bills on new installations, but the Accounting Department is often requested to submit them to us until further notice, for we sometimes find that customers are installing new machinery or perhaps reducing their load, and it is well for us to forestall a possible misunderstanding by investigating and making clear why a bill has been effected.

So much for the process of business development. The form of report used by us is worthy of study and perhaps the best way to describe its scope and arrangement would be to take a specific case and outline a proposition submitted to a large manufacturer of jewelry and silverware, located in our city.

ABSTRACT OF TYPICAL POWER REPORT

The usual investigation was made by our power engineers and a report submitted covering their conclusions. These included a general discussion of the situation of the factory and its tenants, a map of the property, statement that the object of the report was to determine the comparative cost of the present system of motive power, heating and lighting, and the proposed installation of Narragansett service for power and lighting on the premises, description of present system of power and lighting; handling of coal, water, and ashes; use of boilers, steam service, former tests, load curves for five years, present demands, friction tests, indicator cards, costs, electric motor drive and arrangements; cost of electric motor drive and lighting, estimated power, lighting and heating expenses with Narragansett service, summary of future costs and fixed charges. Each of the items discussed in detail under the above general outline was indexed at the beginning of the report, there being in this particular case 32 entries. The details of the index are shown in Table 1, omitting the name of the prospective power user. The thoroughness with which this work is undertaken is most suggestive, and while it costs in many cases several hundred dollars to prepare a report of this kind, we consider it well worth while, since it obviates any false assumptions as to the conditions and assures permanently satifactory relations, so far as engineering skill can postulate them.

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2. Object of Test.
3. Map.
Description of Present System of Motive Power Heating and Lighting.
5. Present Power.
5. Coal.
5. Water.
5. Ashes.
5. Boilers.
5. Use of Steam.
6. Electric Light and Power.
7. Former Tests.
8. Load Curve, 1905.
9. Load Curve, 1906.
10. Load Curve, 1907.
11. Load Curve, 1908.
12. Load Curve, 1909.
13. Load Curve Averages, 1905-1909.
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15. Load Curve P. M. of Jan. 7th.

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20. Indicator Cards.

Cost of Present System of Motive Power, Heating and Lighting.

22. Interest.
23. Depreciation.
23. Repairs and Renewals.
23. Taxes.
23. Insurance.
23. Coal.
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24. Sundries
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26. General Arrangement.
26. Grouping of Load.
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28. Motors and Friction.

Cost of Electric Motor Drive and Lighting.

30. Motors.
30. Wiring.
30. Millwright Work.
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30. Estimated Power Bill.
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31. Summary of Future Costs.
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In the above case the present power is distributed over the three buildings by means of line shafts on each floor, belts, counter shafts, tight and loose pulleys, and a rope drive. There are three small motors already receiving central station service. Soft coal is drawn in by wagon loads daily, no reserve being kept on hand. Water for boiler and drinking purposes is purchased by meter from the Providence Water Works. Water for other purposes is pumped by steam from a well 340 feet deep, whose water cylinder is 4-inch diameter by 10½-inch stroke. This water passes through a settling tank to a triplex pump, which discharges into a roof tank, from which distribution is made to all buildings. The artesian well water is not fit for boiler purposes. A wagon load of ashes is removed daily.

A battery of two Hodge horizontal return tubular boilers supplies all steam and hot water used in the building. One boiler is ample for this purpose, the older one being kept in reserve. Both are 72 inches in diameter and have 96 tubes 3-inch in diameter and 17 feet long. All the day power in the property is supplied by a 14½ x 42-inch Greene engine. This is one of the oldest engines in the city, and has carried its load for so many years, that, considering the replacements and repairs it has received, it is doubtful if it can be relied upon for many more years of satisfactory service. The speed varies from 58½ to 64 revolutions per minute. This variation has been commented upon by machine operators in the factory. The hot water supply has occasionally to be shut off in times of very cold weather, as there is not sufficient steam at such times to supply both pump and engine properly. The power now being purchased for overtime running costs $155.70 per year. Electric lighting for the year 1909 costs $1241.80. Electricity purchased by tenants is not included in this figure.

The management of A. B. & Company has required weekly indicator cards from the engineer of the plant since 1905. All these data were plotted in curves by the Power Bureau, with the results shown in Table 2:

TABLE 2. POWER TESTS 1905-9, A. B. & COMPANY.

LOADS IN INDICATED H. P.

Year	Maximum	Minimum	Average
1905	64	46	55½
1906	68	49	57½
1907	72½	53	61
1908	75	44	62½
1909	79	52	62½

These data show that the loads have increased uniformly since 1905, and the report includes a curve showing the rate of increase. In 1909 a tenant of large power requirements was lost on account of the failure to increase the capacity of the installation. The detailed curves submitted with the report showed the power variation by months, and the general trend of power supply was that the load and therefore the factory output decreases to a minimum usually in April, increases in May, while the spring line of goods is being produced; increases again in July and August, while the fall samples are coming out; decreases in September and then rises to the maximum in October, when the Christmas trade is being anticipated.

The present load characteristics under average working conditions are determined in the report by careful indicator tests made on the Greene engine every 10 minutes for a period of two working days. Table 3 gives the results of these tests.

TABLE 3.

ALL LOADS IN INDICATED H. P.

Date	Time	Maximum	Minimum	Average
Jan. 7	p. m.	76	46	65
Jan. 8	a. m.	73	60½	67
Jan. 8	p. m.	71	50½	66
Jan. 10	a. m.	77	60	71

The indicator cards from which the above data were obtained showed, when plotted in diagrammatic form, that in every 5-hour run, the load begins to decrease 20 or 30 minutes before the hour of closing, at which time the load drops to the regular amount of friction that has to be carried when overtime work is performed. The smallest amount of friction load indicated after the factory had shut down was 46 horse-power. The average of the day loads was found to be 68 horse-power, which is about 8 per cent. greater than the average for the year 1909. In order to avoid underestimating the power cost, the Power Bureau considered that the power to be supplied for the year will be for the same factory output as occurred during the day load tests. The report included three representative indicator cards, showing the maximum, average and friction load on the plant. In the friction load tests indicator cards were taken all one Sunday morning to obtain the power required to drive idle various sections of the building. By moving many belts, and by the free use of tight and loose pulleys and clutches, load was removed from the engine until the idle load had been cut down from 54.5 horse-power to 27.75 horse-power. One hundred cards were taken. Tests made on a 3-horse-power motor in the establishment showed that under normal conditions the load was 2-horse-power and the friction, 0.9-horse-power. A 2-horse-power motor tested showed a shafting load of 0.8 horse-power, and a normal working load of 2-horse-power.

COST OF PRESENT SYSTEM OF MOTIVE POWER.

HEATING AND LIGHTING.

In considering the cost of operating the plant, the report recognizes the following factors as being a part of the cost, and so incorporates them in the estimate. The engine was valued at $1540 and the boiler installation at $1880 by an appraisal company. These values were therefore considered fair. Interest was assumed at 5 per cent. Under depreciation the report says: "There are records today of steam engines which have been running for 125 years; again we have records of steam engines worthless when purchased. There are plenty of electric concerns which have been in business 15 years. Of the apparatus sold to isolated plants 15 years ago, the writer is informed that the General Electric Company estimates that not 10 per cent. of such apparatus is in effective use today. Owing to the rapid improvement, future age may not be so important, but obsolescence is sure to be more apparent than ever. Taking depreciation in its exact sense, $5 per annum for 14 years will produce $102.90, and will enable the owner to charge first cost off completely in say 13½ years. If proper charges are made to renewal account, this seems but fair, but such figures are correct only if no part of the sinking fund is applied to any renewal in the whole 13½ years. It should be available at the end in cash. The difference between two sets of statisticians probably depends upon whether depreciation is made to cover a multitude of sins in which case 5 per cent. is not enough, or whether renewals have their own allowance. In the present power plant, the management has within a year or two installed a new boiler. If uniform and adequate power is to be maintained, it is now time that a new engine should be purchased. Although the present engine has been in service longer than the 13½ years above alluded to, it is still a question if its long life is now a source of profit to the owner. The proper charge to repairs and renewals is a sum sufficient to cover all wear and tear, breakage and decaying parts, so that the depreciation allowance can not only be set aside, but also may be found in a bank account as well as on a ledger page. This amount may be small for the first five or ten years, but for a period of 14 years' experience shows that it is bound to increase.

Statistics of successful power plants show that 5 per cent. for repairs and renewals is sufficient to keep a plant in economical operation, but on an old plant a larger percentage is required. On the plant under consideration this is estimated at $200 per year, or 5.85 per cent. of the principal considered in the present issue.

One per cent. of the total valuation was allowed for taxes on the steam plant, and the same amount was allowed for insurance. The cost of coal for all purposes in 1908 was $2,440.53; in 1909, $2,457.22, or an average bill per year of $2,448.87. The average price was $4.25 per ton. The cost of water in 1909 was $523.26, of which the boiler water came to $400. The present plant requires the services of one engineer at $1200 per year, $200 being allowed for overtime. The distribution of power from the engine by shafting, belting, etc., requires a large part of the attention of a millwright and assistant. On account of all shafting being interbelted, whenever there is trouble with the transmission in the room of any tenant, or at any other part, it is necessary to shut down the engine to rectify the disorder. On this account the strictest watch is kept of the entire transmission. It is probable that only a small part of the millwright work done is for maintenance of machines, and hence $1200 was charged per year against the inspection and maintenance of power delivery to the users. Under the head of sundries comes the handling of ashes, etc., usually from 3 to 4 per cent. on the principal. In this case the actual cost of ash and refuse removal alone is $105.79 per year. Of this, $80 was applied to ash removal.

The report points out that an investment equal to the principal considered in the present steam plant, would, if applied to the business, yield a profit to the owners. This profit is fairly chargeable to the cost of power. A fair business investment shows a return of 15 per cent., 5 per cent. of which is true interest and the balance, 10 per cent., pays for superintendence, return for risk, etc. This 10 per cent. charged to the motive power is not unfair unless the business is of a peculiar character. Table 4 summarizes the total cost of power production under the existing regime:

TABLE 4. PRESENT TOTAL COST OF POWER PRODUCTION.

Interest, 5 per cent	$171	00
Depreciation, 5 per cent	171	00
Repairs and renewals, 5.85 per cent	200	00
Taxes, 1 per cent	34	20
Insurance, 1 per cent	34	20
Coal	2,457	22
Water	400	00
Labor	2,400	00

Sundries, 2 1-3 per cent............	80 00
Electric power......................	155 00
Electric light......................	1,241 80
Profit, 10 per cent.................	342 00
Total........................	$7,687 12

On a basis of 80-horse-power, this gives an annual cost of $96.00 per horse-power a year.

The application of electric motors in this case would be gradual, and would be made without hindering the factory output. Motors would be suspended from the ceiling and belted to the various machine groups. A motor driving an intermittent group could be shut down a portion of the day and save power that is now being wasted. With this motor drive, any room can be run overtime without in any way interfering with the rest of the building, and repairs can be made without shutting down but one of the motors, instead of stopping the whole factory as at present.

The company's proposition called for the installation of 28 new motors, retaining the existing installation. The motors are to range in capacity from ¼ to 20-horse-power, and the total connected motor load would be 143¾ horse-power. The average load carried by the engine is 680 horse-power hours per day. The total power saved by motor application will be 293 horse-power hours, leaving 387 horse-power hours to be supplied by the motors. The above installation would call for a net installation of 142 horse-power in motors at an average cost of $21.80 for horse-power, or a total of $3,095.60. The average cost of wiring for the motors is estimated at $4.00 per horse-power, or a total of $568. The average cost of millwright work for the building is estimated at $1.60 per horse-power or, a total of $227.20 for the work as a whole, to be done by the millwright now in charge of the plant. The labor necessary to care for the motors would be 1 man ½ day per week, the engineer doing this work. The estimated power bill is obtained as follows:

A 26-day month at 287 horse-power hours per day calls for 9,062 horse-power hours. This would require at the motor 7,975 kilowatt hours plus 47 kilowatt hours now purchased, or 8,022 kilowatt hours. On the regular Narragansett schedule of power rates this would give a gross bill of $802.20 per month and earn a discount of 69 per cent., giving a net monthly bill of $248.68 or the 65-horse-power basis. Tenants would use 173-horse-power hours per day, or 3,958 kilowatt hours per month. This sold at 4.5c. would leave a margin of 1.4c. per kilowatt hour profit to A. B. & Company. The monthly profit on the resale of power would be $55.41, so that the final net cost of electric power would be $193.59 per month.

The cost of electric lighting for 1909 was $1,241.80, the price ranging from 9.3 to 13.3c. per kilowatt hour. By contracting with the Narragansett company for all electrical service, the total lighting consumption for these buildings will be presented as one bill, sufficiently large to earn a greater discount than is now obtained. Electricity used by tenants would be resold to them at the price they are now paying, 14c. per kilowatt hour. This would show a profit, which, added to the saving accomplished on lighting used by A, B & Company, $211.47, would make a net cost of lighting $1,030.33 per year.

Were the engine and deep well pump disconnected, all coal used by the boiler would be for heating purposes. In other buildings of approximately the same contents and used for the same purposes as are these, there is required for heating live steam and hot water, one pound of coal per year per cubic foot of factory contents. The buildings have a combined heated contents of 429,250 cubic feet, bringing the coal cost to $912.25 per year. As the amount of steam exhausted in the summer months just suffices for building heating during the winter, it is safe to assume that the future water costs will be reduced $200 per year.

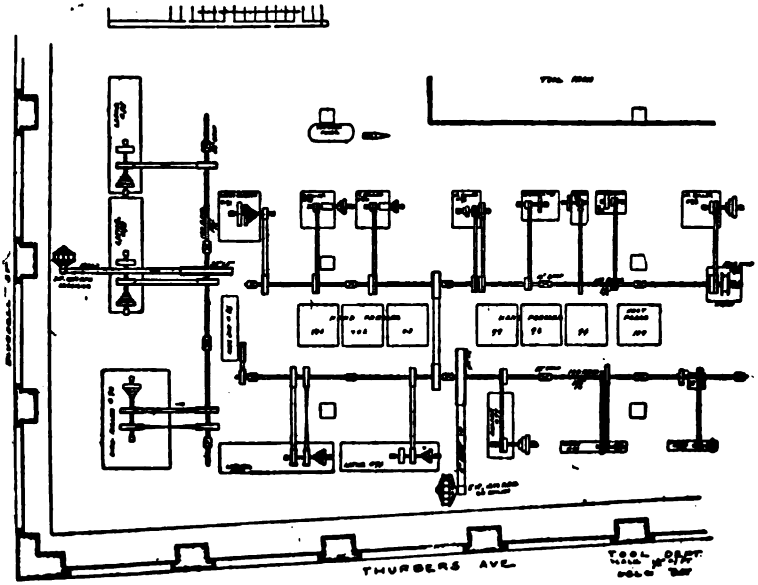
Table 5 shows the cost of operation with Narragansett service.

Table 5.

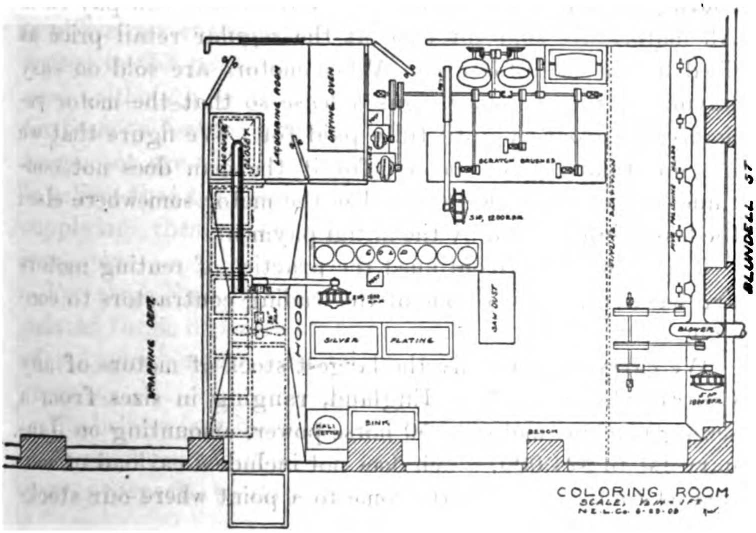
Interest, 5 per cent	$288 54
Depreciation, 5 per cent	288 54
Repairs and renewals, boilers	35 00
Repairs and renewals, motors	50 00
Taxes, 1 per cent	57 71
Insurance, 1 per cent	57 71
Coal	972 50
Labor	1,000 00
Water	200 00
Sundries: boilers, $31.50; motors, $1	32 50
Electric power	2,323 08
Electric lights	1,030 33
Profit, 10 per cent	577 08
Total	$6,912 99

On the basis of 150 connected horse-power, the annual cost is $46.00 per horse-power-year.

The report concludes with the statement that there would thus be a saving of $774.13 per year with the Narragansett service, or 20 per cent. of the entire cost of motors, wiring, and millwright work. In other words, the motor drive would pay for itself in five years. Overtime running of the A. B & Company house encourages the tenants to make free use of power. With each tenant running on his own meter, overtime running would mean increased profits to the A-B people. The failure of the present engine would cause a great loss to factory output before operations could be resumed. The report points out that it is one thing to be dependent upon one antiquated engine and quite another to have 30 power sources fed from a modern central station of practically unlimited capacity. A certain, though indeterminate value should be placed upon the space now occupied by the engine, transmission, shafting, pulleys, and belts, all of which would be available after the installation of the motor drive. Convenience and ease of operation would also follow the introduction of central station service.



TOOL DEPARTMENT



COLORING ROOM

As to the results of this system, we already have over 13,000 horse-power connected load, and the past year secured power business to the extent of 2,997 horse-power. During the same period there were disconnections of 966 horse-power, leaving a net increase for the year of 2,031 horse-power, or a gain of over 18 per cent. We sold about 1,000 horse-power in motors, and, for the sake of co-operation, turned over the sale of about 300 horse-power to the local trade. Five steam plants and one gas-engine plant were discontinued, with a total connected load of over 800 horse-power. We have made strenuous efforts to locate all gas, gasoline, and oil engines and only ten such remain. We are also proud of the fact that every new factory building in our territory was secured last year. The gross receipts on the sale of power were increased a little over 35 per cent. in the same period.

Motors are sold on easy terms and twelve months being allowed for payment, if necessary. There are no fixed terms, the customer being asked to pay as much as he can afford, which is usually not less than 10 per cent. of the cost, and the balance in twelve months. In selling motors on easy terms we add 10 per cent. to the retail selling price, only to discourage this method of purchase by those who can pay cash. All motors are sold for cash at the regular retail price as fixed by the manufacturer. When motors are sold on easy payments, the customer signs a lease so that the motor remains our property until fully paid for. We figure that we are not taking any chances, for if the man does not continue his payments, we can utilize the motor somewhere else; the loss being covered by the initial payment.

The Company discontinued the practice of renting motors and has arranged with one of the leading contractors to continue it.

We carry undoubtedly the largest stock of motors of any Central Station in New England, ranging in sizes from a sewing machine motor to 50 horse-power, amounting on January 1st to $24,000, which does not include a carload of motors en route. As we have come to a point where our stock-room facilities are over-taxed, we are planning to relieve this congestion, and at the same time secure a little advertising, by placing this excess stock on display in the windows of some of the leading contractors. A proposition has been made and accepted by them, which provides them with a consignment stock of motors ranging from 1 to 20 horse-power.

These motors are to be permanently displayed by the contractor, the only condition we stipulate is that they must all be sold on Narragansett service, and that we are to be notified of each sale, when the motor will be replaced. The motors are sold to the contractors at the same prices which they would obtain direct from the manufacturer. One contractor is given a stock of a certain make of direct current motors, another one, a stock of Induction Motors, and still another, some other type of motors. The contractors advertise themselves as selling agents for these respective types, and we anticipate that this move on our part will not only strengthen co-operation, but will also result in increased power business.

This arrangement has only been in effect about a week, so that at the present time it is impossible to state the amount of business that will be secured. Each contractor's stock amounts to about $1000 in motors, and in addition they are all urged to utilize our entire stock ($24,000) of motors, and are not limited to the particular make of motor which they have in stock, although we considered that it would be a good idea for them to feature some one kind. If the results of this arrangement are what we anticipate, and there is every reason to believe that they will be, it may be carried further, that is, supplying them with small eight-inch fan motors, flat-irons, etc.

For those that are interested I have brought with me some printed forms of leases covering the sale of motors, drawings of a typical motor installation, and copies of some recent reports.

We believe in a broad-minded, liberal policy, that in order to secure business, it should be made as easy as possible for your prospects to do business with you; and along these lines, if we are unable to secure the power business by salesmanship and engineering we offer three months' trial installations. If the consumer will do the necessary wiring, we will loan the motors for a three months period, provided, of course, that he pays for the power consumed.

At the present time we have three installations on trial, and during the time we have made this proposition, have lost in only one case, and that a very small one amounting to fifteen horse-power. So that on the whole, we consider the trial proposition satisfactory to the Company, provided the business cannot be secured in any other way.

Last year there was only one isolated plant installed in our territory where the conditions were such that Central Station service could compete, and even in this case, it was due to the desire on the part of the local manager to have his individual plant, irrespective of cost.

It might be interesting to know that we have found our engineering expenses in some individual installations to amount to as high as $500.00. This includes reports, plans, extensive drawings showing shafting and machinery layout, specifications for above, and also for electric wiring for power and light, and superintendence during the process of installation. In other words, we urge our prospective customers to place their entire power proposition with us, and assure them the very best possible service.

The instruments used by the engineering department amount to about $2,000. At the present time we are investigating the operation of steam flow meters with the idea of purchasing the same if they should prove satisfactory for our requirements.

The Company subscribes for all of the leading technical magazines, also obtains proceedings of various technical societies, which are sent to the men's homes. In addition to the above, the Company has purchased technical books which are kept in the office for reference at any time by any of our engineers.

We have abandoned entirely the method of straight soliciting. After compiling a list of the principal power prospects all over our territory, we were convinced that there was very little business to be obtained from the small users, and that future work must be in line of discontinuing existing steam plants and obtaining the new factories as they are erected from time to time. This canvass showed, for instance, that out of a total of forty-five printers there were only two who were not using our power; of the bakers, about 90 per cent. had installed electric power; the same holds true with small carpenter shops, shoe shops and the various line of small industries.

We wish to emphasize the claim made by others, that a great deal of the power business does not remain on during the lighting peak. We have found this to be the case in a large percentage of the plants where we have made tests. That is, although the factory may continue in operation until say, 5.30, the power load begins to decrease somewhat before 5.00 o'clock.

SPECIAL APPLIANCE SALES METHODS.

We believe that some of the methods used by our company in the sale of special appliances are different than those used by most Central Stations, and might therefore prove of interest.

This bureau is in charge of a Heating Engineer, having under him five men. One man is detailed in selling all domestic appliances for the household, including motors less than one horse-power, in addition to heating appliances. Another man works exclusively on the sale of all motors less than one horse-power and industrial heating apparatus for factories, etc. In this way the domestic and industrial work is equally divided and good results are secured.

The salesman in the Display Room also comes under the jurisdiction of this bureau, and the two remaining men are detailed on special work.

We have found that in order to get industrial heating business, it is necessary to go out among the different manufacturers and inquire whether any heat is required in small quantities to do any of their work. There is, of course, a great deal of missionary work to be done along these lines, probably more so than in any other branch of selling electricity, but the results usually justify the time spent.

During the past year several fair size industrial installations were made. One, a silver electrolytic which called for the baking of a silver deposit on glass. This was in the form of a furnace which takes 26 kilowatts to operate, and for the past seven months has given us a net income of $154. Another was the installation of electric heaters in a tire repair shop, and for the past eleven months has given us a net income of $72.

In order to give somewhat of an idea of the accomplishment along these lines, the following is a list of special appliances made to order to suit exact conditions:

Two 440 watt heaters for melting cocoa beans.

One bon-bon heater, maximum 1100, minimum 275 watts, for keeping bon-bon filler soft.

Two chocolate melters for softening chocolate for dipping purposes; 200 watts each.

The above were made for Huyler's store, this city, and on a separate memorandum meter, for one month showed the total use of 375 kilowatt hours.

A medical sterilizer was converted from gas to electricity, making a total wattage of 3360, and with an income of $3.64 a month. This was for a local physician.

One embossing press head heater, operating 750 watts, maximum 3000 watts.

One embossing press head heater, operating 250 watts, maximum 1800 watts.

One glue pot used only in summer, operating 325 watts, maximum 1400 watts.

A total consumption of about 108 kilowatt hours per month. The above were installed in a Blank Book Company.

One bacteria slide heater, operating 300 watts was sold to the Milk Inspector of the City of Providence.

One special type soldering iron, operating 220 watts, was installed in a small button factory, which brings an income of $5.60 monthly.

A special heater was made for a Slate & Gravel Roofing Company for melting tar in barrels.

A special window-sill heater for residence use was designed, together with a number of special laboratory plates, hot plates, etc.

Practically all the comb factories in this city are using electric heat, replacing other methods. In one comb factory we have as many as sixteen special heating appliances, with a total of 16 KW, giving an annual income of about $645.

At the present time we have under consideration the designing of a melting furnace for four-ounce platinum. This, if accomplished, will open a very large field here in Providence, for gold and platinum melting, especially as there is a large amount of jewelry business conducted in this city. Also a japanning furnace of five kilowatts has just been completed and connected, to be used for japanning small jet jewelry. We are having built a small furnace for annealing brass bobbins used in lace works. It will be of five kilowatt capacity and it is intended that it shall anneal 100 bobbins in one hour. This would mean five kilowatt hours and at 10 cents gross rate, would cost 50 cents. It is intended to do this twice a day, the present cost of annealing is $3.00 per hundred.

Practically all of the above industrial heating work has been secured on existing lines, the advantages of which you are all familiar with. We estimate roughly that at the present time our heating income amounts to $28,000 annually.

There is undoubtedly a large field for work along these lines. A great amount of detail and some engineering work is necessary, in view of the fact that many of these appliances have to be designed and made special for individual cases.

We are convinced that the work above accomplished is a very small part of what the future has in store for us. Of course, securing industrial heating business is just as desirable as motor load, in view of the fact that current is consumed during the day time, and as stated above is secured mostly on existing lines.

We have brought photographs of a number of the above installations, and would be glad to show them to any of those interested.

In regard to the introduction of domestic appliances, would say that at the present time over 60 per cent. of our residential customers already have flat-irons, and during the past year our net gain, in connections of special appliances was 46 per cent. The total connected special appliances December 31st, 1909, was 1123 kilowatts, which compares with the New York Edison's report of January 1st, 1910, which shows a connected load of 1218 kilowatts. (This from Electrical World of March 10, 1910.)

Last year we made arrangements with one of the manufacturers of flat-irons to send two trained solicitors into our territory to sell flat-irons, anticipating that the results would be better than we could do ourselves. On this score, however, we were disappointed and after the experienced solicitors left, having thoroughly canvassed it, we sold two or three times the number of irons that they had sold. I merely mention this so that any of those that are considering this proposition will be familiar with our results.

In regard to the luminous radiators, would say that our Company is renewing the lamps free, the same as the ordinary carbon lamps when returned to us burned out. This may be somewhat of an innovation and not done by some companies. The income is quite large from these radiators used, and we fully think that it justifies free renewals of the lamps.

During last year 107 small motors were sold, which does not include any one-half horse-power motors that were sold to be operated through a power meter, including twenty-one massage vibrators, fifteen vacuum cleaners, eleven sewing machine motors, etc. These sales, of course, were of articles sold direct by the Company, and does not include any articles, of which there were many, that were sold by the manufacturer or the local trade.

Practically all of the blacksmiths in the territory are using electric forge blowers.

We intend to purchase several hundred eight-inch fan motors this year and are making an energetic campaign for their sale, believing that there is a large field for this small fan, which has not been covered before.

During the last Christmas holidays, special advertising was done in the newspapers and a booklet issued, and by carefully watching the results, found that sixty sales were made for Christmas gifts, and of these sales forty were traced directly to the booklet and two sales to the newspaper advertising. We received a total of sixty-five inquiries from the booklet and twenty from the newspapers.

On about July 1st last, a new salesroom was opened in the office which has resulted in about 180 sales, exclusive of 145 trials. In this display room we have connected a one horsepower motor with an indicating also recording watt-meter, and arranged the scale on the indicating watt-meter to read cents per hour instead of watts, and use this for demonstrating to the customer how the current is recorded and also that the cost of operating the motor varies according to the load placed on it; having connected to the motor a sort of footbrake, first allowing the motor to run idle and then by foot pressure on the brake, to demonstrate as near as possible the varying load.

All our industrial heating appliances are grouped in our Display Room. This gives observers opportunity to get a fair line of what is being done by the Company in this direction.

We make a specialty of selling portable reading lamps and have sold quite a number of them. Our object in encouraging the use of these lamps especially, is on account of their long hours use.

Aside from the above, the display is conducted along the lines of which you are all very familiar.

The company has just decided to guarantee for two years, all heating appliances against defect, accident, carelessness, in fact anything. This is a very broad guarantee, but we believe it to be good judgment. At the present time we are carrying a $5000 stock of heating appliances and expect to increase it.

In addition to a special stock room for these appliances we have a small repair shop where all appliances are repaired that can be without returning them to the manufacturer. Thereby a saving in time is effected and in addition to this we have a number of appliances which we keep on hand to loan customers when theirs is being repaired.

LIGHTING SALES METHODS.

This branch of our Sales Department consists at the present time of but five men, including our Illuminating Engineer in charge. Plans have been perfected, however, of materially enlarging the size and scope of this branch of our selling force. With the small force available, no elaborate system of sales methods is possible and none are attempted.

Our entire territory is divided into districts, each man being given a certain section, limited to that section, and expected to develop its possibilities according to his own best judgment. The city is so sub-divided that each salesman has a portion of the business and residential sections.

A fairly close watch is kept on the work of each individual salesman, and periodical tours of inspection are made over the various sections by the Illuminating Engineer for the purpose of assuring himself that nothing is being overlooked.

The largest portion of our efforts is directed to the business sections of the city, and I dare say, the merchants in all the various territories are solicited at least once every month. Residential work is not solicited excepting such as may be in course of construction or undergoing repairs. For the purpose of following up the latter item with a view to securing all the new and a goodly portion of those older houses undergoing repairs, we keep a close watch on the building permits as issued from the office of the Building Inspector, make records of them, and then refer to the various salesmen for investigation.

Of the new dwellings erected, between 80 and 90 per cent. are being wired for electric service. Approximately 25 per cent. of those older dwellings undergoing any material repairs are also being wired for electric lighting.

A card system of records of the daily calls is made by each individual salesman, passed along for scrutiny by the Illuminating Engineer in the morning and filed for future reference, or a further report at a later date. Each salesman makes his own notations on the daily cards of such future calls as are to be made on a prospect, and is assured of the card being returned to him on the date mentioned for a further report. This operation is repeated until the prospects is either closed or has been passed up, which latter is seldom the case.

Our yearly returns of business secured by our lighting salesmen has averaged about 7000 16 candle-power equivalents per man, of strictly new business. By new business I mean absolutely new wiring, the amount does not include transfers of accounts or the replacement of any installations.

Some little time has been devoted to the design of new installations and the correction of old ones with highly satisfactory results in general, but the work on an elaborate scale is not encouraged yet, owing to the inability of our small force to devote the necessary time to it. Eventually, I feel that work of this nature must be undertaken and we are gradually equipping ourselves for the work. The same is almost equally true of matters pertaining to electric sign advertising.

Our experience with Tungsten lamps covers a period of but about ten months, during which we have installed some 25,000 lamps, mostly of the 250V type and this with little or no advertising. Our largest single installation of Tungsten lamps is one of 3250 in one of the local dry-goods stores. All of these lamps are of the 250 volt type.

We have, in round numbers, 350 signs in nightly operation, including lamp letter, transparency and border light. All single light signs are ignored on our records.

In all matters pertaining to the use of electricity for lighting purposes, the company, as in the case of power installations, adopts a broad and liberal policy in the matter of any investigations desired, and offers to those using a combination gas and electric system the same inducements relative to the trial use of service for a three months' period, where the monthly consumption would warrant our wholesale schedule of charges.

THE PRESIDENT. You will now have an opportunity of discussing the very instructive paper we have just listened to, and of asking any questions that may occur to you. I hope that this discussion may be open and free and that many of the members will take part. In order to start the discussion I will call on Mr. Davidson of Montpelier, Vermont.

MR. DAVIDSON. Mr. Chairman, I think after hearing Mr. Davenport's paper we—and especially those who have looked over his blue prints and other data—will agree with the statement made in the fore part of his paper that they do have a system second to none. I think a great many of the central station men, particularly those interested in small companies, will say that they could not entertain the idea of going into an elaborate report, in soliciting power business. You will find you are up against two things: that generally prospective customers are very ignorant, or they go to the other extreme and have a reasonable amount of information about their installation, therefore it is necessary to go slowly. Where we make a mistake in soliciting business is that we do not educate the ignorant customer and give to the customer familiar with his conditions figures that will enlighten him and show him the advantages of taking electric service. I think right along this line the greatest difficulty we have is to get the small manufacturer to consider the question of depreciation. Now, of course, that laid aside, it is pretty hard to make a showing of electric vs. steam power or that of the gas engine. Then, again, in soliciting business, one thing must be considered seriously and it is a vital point; that is the reliability of service. You can not get power business unless you give good service. A manufacturing plant always has in mind the large number of men who are dependent upon the service, and if the power is shut off the expense of labor goes on just the same and there is a big loss. That will kill the power business quicker than anything else. Mr. Davenport uses in his specific installation five and a fraction per cent. for maintenance. I thought that might be a little bit misleading. We generally consider in electric plants that two per cent. is sufficient, but, of course, on top of this there must be a depreciation charge.

Along the line of soliciting lighting business, also, in the small and medium sized stations the superintendent, or manager, is apt to solicit business from the stores entirely, and I think the reason of that is because it is easiest to get it. We ought to fix that up, of course, and do everything we can in giving such service, but I think we can make our greatest strides in getting new business on existing lines and get entirely new business by working with residential customers. It is hard, but we must do it. It can be done in various ways. We found in Vermont that sending around illuminating engineers to rearrange the lighting generally has resulted in a realization by the customer that we are doing for him something to his advantage, and he has become more interested in the lighting in that way. He will talk favorably, too, with a neighbor who is not using electricity, and we thereby get an entirely new customer.

I have some questions I want to ask Mr. Davenport, and I will read them for him.

What is Providence system of rates for power?

What type of contract is required from power customers, such as different conditions, etc?

Should gas producing and Diesel oil engines be considered in soliciting power business?

What are the industrial heating rates? Why didn't the heating manufacturer's solicitor make good? And this I ask for the benefit of Class D members.

Do you know what percentage load factor increased by new power business?

Mr. Davenport. In answer to Mr. Davidson's question in regard to the maintenance of 5.85 per cent., in that particular case it happened to be the exact cost of maintenance, and that is how we got the figure.

With regard to the system of rates for power in Providence, the gross rate is ten (10) cents; minimum rate, 2½ cents per K. W. H. It is based on the horse-power connected, and the monthly consumption. For instance, a one-horse-power motor using $1.50 of current would be entitled to a discount of 5 per cent. The discounts range from 5 per cent. to 75 per cent., making the lowest net rate 2½ cents per K. W. hour.

In regard to the type of contract, I would say that our contracts are based on one year's term. If we cannot get business on that basis we take a three months' trial or in some cases a year. There is no other condition in the contract except that while using the service they pay for it at the contract rate.

In regard to the question of gas producer and Diesel engines, the latter are manufactured in Providence. We have had some competition, but not much, with the Diesel engines. I do not think we have had any with gas producers. In the case of Brown & Sharpe, they have a producer gas plant and with that also have an auxiliary connection with us, for which they guarantee a thousand dollars a year. In the case of the Diesel engine installation, the only one I can recall in

Providence happens to be in the Gorham Manufacturing Company. They also have an auxiliary contract which guarantees a thousand dollars a year, and the current is metered on the high tension side.

In answering the question as to what the rates are for industrial heating, I would say that we give the same rates on industrial heating as we do on power. Placing it on the same basis,—gross ten cents and give them whatever discount they earn, according to regular schedule.

With regard to our experience with the manufacturers, furnishing solicitors, etc., it is rather difficult for us to determine what the cause was why we did not sell more flat-irons. We gave every possible leeway with what they wanted us to do. They did not sell. Probably it was due to the salesman.

In regard to the question of the load factor, it has been increased 18 per cent. since we began to go into the power business.

THE PRESIDENT. Is there any other member present who wants to ask Mr. Davenport any questions?

MR. WALTER P. SCHWABE (Windsor Locks, Conn.) I would like to ask how you determine the demand for power—by total installation or demand meter?

MR. DAVENPORT. It is based on connected load.

MR. FLEET. Mr. Davenport made the statement a little while ago that he charged the same rate for heating appliances as for power. I want to know whether or not you install two meters, and if you do, what must the heating load be before you install the second meter?

MR. DAVENPORT. That refers to industrial heating. We give the same rate for industrial heating as we do for power business, and a separate meter is installed. We have not placed any limit on the size of the installation; we have not thought it necessary.

Mr. Fleet. Supposing a case of putting in a cook stove or electrical range, would you put in a second meter?

Mr. Davenport. No, in that case you would get the lighting rate. That would not come under the industrial rate.

The President. Would anyone else like to ask any questions?

Mr. Sands. I would like to ask Mr. Davenport one question. He states that he would use the connected load as a basis for determining the demand. How would you handle metal work construction where the actual demand would be for a very small percentage of the total connected load? Do you find your customers would stand for installations of that character, in which the connected load would be taken as a basis?

Mr. Davenport. We have not had many instances of that kind, but where we have, we made tests and then based the rate on the tests.

The President. If Mr. Rollins of Hartford is in the room I would like to call upon him. Is there not some gentleman here who would like to ask some more questions, or who has anything to say on this point?

Mr. Hunt (Maine.) I would ask if Mr. Davenport's company has done anything towards getting business of the small residents. Business must be handled at a low rate for such customers, but it must be a business of low guarantee if it is possible to obtain it.

Mr. Davenport. I said we got a large percentage of new residents, which means the residents in new dwellings erected, between 80 per cent. and 90 per cent. The others we do not bother about.

Mr. Vredenburgh. I would ask what information you have in regard to the installing of flatirons on lamp sockets.

Mr. Davenport. We have not had any trouble to speak of. I know of only one case, and I do not recall just what that particular installation was. We found that that was more theory than anything else. When we first went into the flatiron business our technical engineers objected to 500 watts being connected to the lamp socket, but we had one man at the station connect up a flatiron with the alternating service and another with the direct, who kept busy turning the flatirons on and off all day by the key in the socket. The only one that gave any trouble was on the 250 volts of the direct current. After this test we decided to put the irons out to be connected to any lamp socket.

Mr. Vredenburgh. You have the key in the socket?

Mr. Davenport. Yes.

Mr. Vredenburgh. Free renewals or repairs?

Mr. Davenport. We have not adopted any policy on free renewals of irons, but we have decided to guarantee all the heating appliances, for two years, against anything. Any iron that has been used less than two years we renew free.

The President. If there is to be no more discussion of this subject, we will take up the next matter on the program, which is General Business.

If you will remember, the President, in his remarks, referred to the matter of the growth of this Association, and how considerably it has been helped to reach its present stage by the associations that have preceded it and other associations that have since amalgamated with it. One of these associations is the Vermont Electrical Association. A committee has been appointed to draw up resolutions. If that committee is ready to report, we will be very glad to hear from them.

Mr. Sands. The committee begs to offer for adoption the following resolution:

Whereas, the Vermont Electrical Association, which has always shown its hearty co-operation in the work of the National Electric Light Association, still further demonstrating this as well as the loyal friendship of its members for the men in the New England Section, by voting unanimously at its annual convention last September to affiliate with the New England Section, therefore be it

Resolved, That we, as a section, hereby recognize its "get-together spirit," welcoming the Association and assuring its officers and members of our fullest appreciation of their action, and that we fully realize the importance and worth of their support.

The President. You hear the resolution offered by Mr. Sands. What is your pleasure?

(On motion of Mr. Stetson of New Bedford, the resolution was adopted by unanimous vote.)

The President. Is there any other business at this time? If not, the next in order is the election of officers for the ensuing year. A committee was appointed at the session yesterday to nominate officers for the coming year. Is that committee ready to report?

Mr. Stetson. Mr. President and gentlemen, the committee appointed to attend to this duty have attended to it, and we beg to submit the following report:

For President, J. E. Davidson of Montpelier, Vt.

For Vice-President, Alexander J. Campbell of New London, Conn.

For Secretary and Treasurer, L. D. Gibbs of Boston.

For Executive Committee, J. A. Fleet of Portland, Me.; J. S. Whitaker of Portsmouth, N. H.; F. H. Parker of Burlington, Vt.; H. T. Sands of Malden, Mass.; A. B. Lisle of Providence, R. I.; R. W. Rollins of Hartford, Conn.

I would say that the vote was unanimous by the committee.

(On motion of Mr. Stetson the Secretary or other officer of the Association was authorized to cast the vote of the Association for the nominees of the committee.)

The President. Before that is done I would ask if it will not be necessary for the Convention to receive the report?

(Mr. Stetson repeated his motion. It was then voted that the Treasurer cast one ballot for the officers as reported by the Chairman of the Committee on Nominations. This was done, and the whole list was declared elected.)

The President. I will appoint W. H. Cole of the Edison Electric Illuminating Company a committee to escort the new President to the platform. (Applause.)

Mr. Davidson was escorted to the platform by Mr. Cole and was applauded as he stood before the audience, amid cries of "Speech! Speech!"

The President. Gentlemen, here is your new President. (Applause.)

President Davidson. Gentlemen, I thank you very much indeed for this honor. I have only one request to make, that is, that the members give to the officers of the Association during the ensuing year the co-operation that we have had in the past. It is only by their efforts that we have been so successful, increasing our membership and doing such good work.

It seems to me quite timely to make a remark in regard to membership, as it has been brought up several times in the meeting, and I was a little afraid that perhaps after Mr. Martin finished talking this afternoon he might have frightened us. He says that in five months the National Association has increased its membership by 500. In a year, although you must take into consideration the fact that we took over one large association. we have made a membership roll of 650. On the other hand, the National Electric Light Association have about 4800 members and we have 650, or 12.8 per cent., therefore you can see that we are doing pretty well. All I ask is that this year we aim to keep up that same ratio. We have the best and the biggest section of the National Association in the country. Now let the good work go on.

I thank you very much for your attention. (Loud applause.)

Is there any more business to come before this meeting? Mr. Smith, have you any more matters to bring before the convention? Gentlemen, I am going to turn the chair over to Mr. Smith, as he seems familiar with those subjects. However, before Mr. Smith takes the chair, I feel it would be hardly proper for us to close this meeting this afternoon without expressing in some way our appreciation of what President Smith has done for the Association during the past year,—personally I know that he has put a vast amount of thought, time and hard work into it, and therefore I move that the Association express, by a rising vote of thanks, its appreciation of what Mr. Smith has done.

(The motion was seconded by Mr. Sands.)

President Davidson. Gentlemen, you hear the motion which Mr. Sands has seconded, and there is no question but what President Smith "has carried the message to Garcia." All those in favor of that motion will signify it by standing.

(The whole assemblage arose, and the Chairman announced "The vote is unanimous" amid hearty applause.)

Mr. Cowles. If I may be permitted to say one word further along the lines of Mr. Sands' motion and his remarks on the motion which has just been passed, I would add that the interest attending this meeting and the record of this organization thus far certainly bears wonderful testimony to the field of work and of the usefulness of this Association. Incidentally, it seems to me it answers very satisfactorily the question we were discussing a year ago at this time as to the advisability of merging one or more, or one in particular of our local organizations into the larger organization. The figures that have been brought out today certainly seem to tell as to what has been accomplished, and they are the best promise of what still may be hoped for. But, gentlemen, these things do not happen of themselves. While momentum may always be counted as an important factor to be dealt with in all such matters, it is chiefly due to the energetic and indefatigable efforts of the officers in charge of the work, and the motion which has just been passed as a compliment to our retiring President is surely most fully justified and warranted. It was my thought to offer a similar resolution, but I had in mind carrying it a little further, and that was to include in that motion the entire Executive Committee of the Association. I see no objection to offering a second resolution along the same lines, and I therefore beg to offer the following:

Resolved, that the members of the New England Section of the N. E. L. A. hereby ratify and approve the action of the Executive Committee in the management of the Association affairs and the conduct of its officers and their action generally, down to this time.

(The motion was adopted by unanimous vote.)

President Smith. Gentlemen, there is only one more matter I wish to refer to, and that is in reference to the banquet this evening. I want to thank you all for the kind remarks which have been made. I appreciate them deeply, and I desire to express my appreciation to the other officers of the Association, for the loyalty that has been displayed during the entire year. (Applause.) When you assemble this evening will you please assemble in this room?

President Davidson. Unless there is more business to come before this meeting, a motion to adjourn is in order. There appears to be one more report, and that is the report of the Auditing Committee.

The Auditing Committee reported that they had examined the Treasurer's accounts and found them correct. This report was received and placed on file by unanimous vote, and at 4.49 o'clock the Convention adjourned *sine die*.

EVENING SESSION.

A banquet was served at the American House in the evening, and at its close the New England Section resumed its business session.

The President. After having heard from so many of our members at our previous sessions, I am quite sure that you will not be satisfied until you have heard from one more of our past officers. It gives me great pleasure, gentlemen, to call upon our genial Secretary, Mr. Charles H. Hodskinson, from whom all of us will be pleased to hear some remarks. (Applause.)

MR. CHARLES H. HODSKINSON.

Mr. President, guests and members of the New England Section: I know it is quite an imposition to ask you to listen to my remarks, and particularly when my voice has been raised, perhaps too much, in the conduct of affairs in the New England Section, but I have a particular reason for addressing you this evening, which I will tell you in a very few words. We have been very fortunate in listening to some of the eloquent speakers of the National Electric Light Association, and I know that you all feel honored, as the officers of this Association do, in having heard the President of the National Electric Light Association and later the Executive Secretary of the Association. After-dinner speech-making is not exactly in my line, but I want to say to you, gentlemen, that we have here with us this evening one other member of the New England Section, whose work in behalf of this body is hardly known to a member in this room. He has been working behind the scenes, but the work that he did in the early days of the formation of this section entitles him to more credit than I think we have been wont to give him, and I refer, gentlemen, to your friend and my employer, the President of the Boston Edison Company, Mr. Charles L. Edgar. (Applause.)

When the idea of organizing this section first came up it was turned over to one or two of us to go ahead with the pioneer work. We had been working but a very few moments before we discovered it required something more than hot air. We found that it needed somebody of influence, somebody who was willing to lend his influence to the movement. We found in Mr. Edgar an ideal friend, and I am going to say to you that Mr. Edgar has devoted considerable of his time and considerable of the Edison Company's money in furthering the project of this Association. I think he has expended the money in a good cause. It is not very often that in my eighteen years' experience with this company I have had an opportunity to talk to Mr. Edgar, the boot is generally on the other foot, but I really think that Mr. Edgar's modesty has prevented him from getting the full credit for what he has done for this Association. If I should apply the title to him which I think he properly is entitled to carry in reference to this Association, I should call him the "Father of the New England Section." (Applause.)

The success with which our Association has met since our last meeting, at Newcastle, is reflected in the membership which is here in this room this evening, and I believe our Association has been put upon a footing now where nothing can interfere with its progress and success. I shall sever my official connection with this body this evening, but I shall not lose interest in it, and I hope I can be considered one of the "live wires" attached to it. I know that the officers and members of the Executive Committee, and members of the standing committees of this Association, have put in a tremendous amount of work. I also know that there are other people who have worked behind the scenes. I refer particularly to Mr. Gibbs' assistant, Miss Bursiel, who has done a very large amount of work to help advance the cause. I also know that Mr. Gibbs, too, has worked almost night and day for the last three months, and I don't know what would have become of us if we had not had the benefit of his guiding hand. (Applause.) It is a matter of particular pride to me to think that we can boast today of having one-eighth of the total membership of the National Electric Light Association in the New England Section. Think of the tremendous investment there is in the central stations in New England, whose representatives are in this room this evening.

I want to take this last opportunity of thanking you on my own behalf for the uniform courtesy with which you have met all my efforts. If you had not entered into the spirit of the thing in the same manner that I have I know that there would have been trouble in my office, but I thank you and wish you all possible success for the future. (Applause.)

The President. Gentlemen, I am in full accord with what Mr. Hodskinson says. We have a great deal to be thankful for in having had the assistance in the development of our Association of a man who has the reputation, the courage and ability that Mr. Edgar has, and I know that you will be very glad to hear also from him. I, therefore, take great pleasure in introducing to you Mr. C. L. Edgar, President of the Boston Edison Electric Illuminating Company. (Applause.)

MR. CHARLES L. EDGAR.

I don't know that I have anything special to say tonight, except perhaps one thought, and that is that notwithstanding the great success that this New England Section has had we must not forget that it is a section of a national organization. I know some of us have had the feeling for some time that it might become so prominent and so self-contained that it would lose some of its allegiance to the parent organization, and I simply want to suggest and urge that we do not forget that the stronger we are the stronger, of course, they will be. On the other hand, the stronger they are the better it will be for our organization. In the convention which is to take place in the course of the next two or three months nearly a thousand miles from here, I hope we will all feel that as many of us as possible ought to go to that convention, in justice to the present officers and the present President, who is sitting here at my left, and in justice to ourselves. With this thought I say that I am very glad to be here tonight, and I thank you very much. (Applause.)

The President. Gentlemen, you may be interested to know that up to the present minute we have enrolled as members of the New England Section 648, of whom 460 have registered at this convention. (Applause.)

The next business in order is a paper which is to be given by one of the ablest representatives of any electric lighting company in New England, and perhaps in this country, who has given this subject of the price of electricity more thought and more attention than any other one man. It so happens, unfortunately, that Mr. Hale, the author of this paper, could not be present at this meeting, as he is now in the west. The paper will, however, be read by Mr. Gibbs, and will you kindly give him your attention?

PRICE OF ELECTRICITY.

R. S. Hale.

Every manager has to advise on, and usually to determine, the prices at which the electricity produced, or rather the electric service rendered, by his particular plant shall be sold.

The prices in our different plants are apparently very different indeed, but since on the whole there is a very considerable similarity in the amounts of the actual bills when the conditions are the same there must be some basic principle, or principles, that determine the prices of electricity in different companies, and an understanding of these principles will help whenever any change of prices is under consideration.

In the following paper I will outline the principles that have been followed in working out electric prices.

Now the question of prices depends very largely, in fact, entirely on costs. These differ in different companies and from time to time, but I shall devote my attention almost exclusively to the costs and prices of the Boston Edison Company in recent years because so far as the principles are concerned, these differ but slightly from those of other companies. However, as our costs vary from year to year, and as we are discussing the principles rather than the exact figures, I wish it understood that I am not attempting to give them with absolute accuracy, but am using them chiefly for illustration. In fact, the 1904 figures are higher than our present costs though the principles are the same.

The total cost for supplying service is, of course, the same as the gross income. When I say that the total cost corresponds to the gross income, I am assuming that a fair dividend on the stock is really a part of the cost. Of course, if there is a deficit after paying a fair dividend, or if there is a larger surplus than is necessary for a proper reserve, then the gross income is less or more than the total cost, but in most well run companies, the gross income and the total costs are substantially the same.

The question of the total cost is simple. It is merely a question of adding together the costs of the different departments and of the various taxes, fixed charges, reasonable dividends, etc.

The question of the total of the prices is, likewise, simple, because the total of the prices must be the total of the costs.

The really difficult question is the proportioning the part of the total costs to be borne by each different customer, or class of customers.

The fact that electric companies have made an attempt to solve this question from a scientific point of view has led many people to feel that our prices were subject to much greater complications than for most businesses. The reverse, however, is actually true as may be brought out by a homely though amusing illustration.

Suppose a farmer buys a calf for $9, spends $1 worth of his time in killing and skinning it and then starts to figure out what is the proper price at which he should sell the veal and the price at which he should sell the hide. The farmer does not have to consider the question from a scientific point of view. He merely sells the hide and the veal for what he can get, and for the most he can get, and if he could get $15 for the hide and $20 for the veal, he would take them without a qualm of conscience or any idea that the commissioner of agriculture might hold a hearing as to reducing his prices or determining the fair market value of his farm.

Public service corporations, however, have a monopoly, whether as a result of their franchise, or because their officials run the business so efficiently that no one wants to compete with them, and in return for their monopoly, they are expected to sell what corresponds to their veal and hide at fair prices. It should be noted, however, that this requirement should extend only to the extent of the monopoly granted. If a public service corporation has two products, in respect of only one of which it has a monopoly then the public has a right to control only the prices of the monopolized product, and in respect of the product for which there is no monopoly the public has no right to determine prices. For instance, the Edison Company, and I hope most electric companies, has an absolutely fixed price list for the sale of electricity, but when we sell flat-irons or lamps we are just as free to have special prices and bargain sales as any department store.

Returning now to electricity itself and using Boston Edison figures, the total cost of our current and service was $2,700,000 in 1904, and $4,100,000 in 1909, and these *total* amounts were a fair price for our total current and service; but not only is it necessary that the *total* price should be a fair one, it is also necessary that the *division* of the price among our different customers should be a fair one. In fact, this is a most necessary feature since it does not affect a business man very seriously to pay an extra charge of 10 per cent. provided his competitor likewise pays the same extra charge, while if a business man pays only a fair charge, but his competitor gets 10 per cent. rebate, then the first customer is worse off in spite of the fact that in this case the seller is getting a low price, while in the other case the seller was getting an unfairly high price.

Now, how is the $2,700,000 which it cost the Boston Edison Company in 1904, or the $4,100,000 which it cost it in 1909, to be divided up among its customers?

If we divide the total income by the total number of customers we find that the average income was about $200 per customer in 1904, or $160 in 1909.

If we divide the gross income by the total number of lamps or their equivalent, we find that the cost was about $3 per lamp in 1904, or $2.25 in 1909.

If we divide the gross income by the total number of kilowatt hours, we find that the average cost was about 10 cents per kilowatt hour in 1904, or about 6½ cents per kilowatt hour in 1909.

While these are the average costs or average prices per customer, per lamp, or per kilowatt hour, it is perfectly clear that we cannot depend solely on averages in any particular case any more than we, ourselves, would be satisfied to have the total payrolls of our various companies divided by the total number of employees so that each employee should be paid exactly the same salary. The average cost per customer of the Boston Edison Company is between $150 and $200 each, but some customers cost very much more and some very much less. The average cost per lamp is between $2 and $3, but some lamps cost much more and some much less. The average cost per kilowatt hour is from 6 cents to 10 cents, but some kilowatt hours cost us 15 cents, 20 cents, 30 cents and 50 cents each, and some cost hardly more than one-half cent each. It is obvious that we cannot make the same charge either per customer, or per lamp, or per kilowatt hour, and before considering the amount, we may ask whether there is any theory that determines on which items the charge shall be based. The earliest public service corporations in the modern sense were probably the toll roads and bridges. The first made a charge varying with the distance traveled and the bridges made a charge depending chiefly on the weight, though so arbitrarily made up that no very definite rule can be discovered. The water companies, which were also some of the earliest public service corporations, began by making the charge proportional not to the amount of water or value of service rendered, but proportional to the value of the land or house to which the water was supplied, and while this method has continued even to the present time, the tendency is now in the line of making the water charge proportional to the number of fixtures that can use water and to the quantity of water used. It should be noted, however, that the tendency towards meter rates for water is only in part because this is considered a fair method, it is partly because it prevents waste.

The comparison between roads, bridges and sewers (which are always considered proper subjects of municipal enterprise), water supply (which is often so considered, but is carried on successfully by private enterprise), gas and electricity (which are usually best done by private enterprise, but occasionally well done by the public), and such enterprises as municipal ice or municipal contracting or municipal houses (which, as we know, have always proved failures) may perhaps indicate a guiding rule. Roads and bridges are successfully carried on by the public but for their use no charge is made. Water works are usually, though not always, well done by the public, and the public intends that everyone shall have water, with no charge except such as is necessary to prevent waste. The public intends that everyone who wants them shall have gas and electricity at a fair price but in this case the public wants the price proportional to the cost of the service, and for this reason seldom does the work itself. I presume that the public also intends that everyone who wants food, or houses, or clothing, shall have them at a fair price, nevertheless the public for some reason does not feel the necessity so strongly as in the case of roads or bridges or water, and the supply of food or clothing has been carried on by municipalities successfully only in times of great stress. In other words, successful instances of municipal management have almost invariably been cases where the municipality wished to supply the product free or at less than cost, as in the cases of bridges and water, or of food at times of famine, and the instances of a municipality successfully engaging in genuine trading for profit have been very rare. Hence, when work is done by private companies the prices should depend on the costs, since there is no special reason for giving electricity without charge or at less than cost, as the use of roads and bridges is given without charge, and there should be some electric unit or basis of charge proportional to cost. There is no essential reason why either the kilowatt hour or its multiples or sub-multiples, the lamp hour or horse-power hour, should have been used. The telephone companies and some water companies charge so much per customer, but by a graded differential system they take account of the fact that some customers cost them more than others. In the old days the electric companies charged so much per lamp (usually $12 per annum) and some electric companies and some water companies still use the same principle, the water companies' charge being so much per fixture. In all these cases, however, the companies (or municipalities, when the supply is municipal) have by various systems of differential charge recognized the fact that some telephones, or customers, or lamps, or fixtures cost them more than others.

I will not go into the history and science of electric supply to explain why it is that most electric companies have finally settled on the kilowatt hour as the basis of charge. In fact, I could not, since this has come about more as a matter of growth than from any well-defined plan or reason; but I do wish to state most emphatically that there is just as much reason for differentiating between the kilowatt hours that cost the company 20 cents, 30 cents and 50 cents each, and even more, and the kilowatt hours that cost the company less than one-half cent each as there is between customers and lamps. It would be just as unfair to charge the same rate per kilowatt hour for all kilowatt hours as it would be to charge each customer $160 per year, whether it cost us $1 a month to supply him or $10,000 a month. We intend that each customer shall give us a fair margin of profit, if we can get it and shall in no case be supplied at a loss. We supply some lamps at a cost of $1 per annum each, and even less, and get as high as $10 or $15 per annum from others, and again intend that they shall all give us, so far as possible, a fair margin of profit, and that none shall be supplied at a loss.

We supply some kilowatt hours at 20 cents and some at three-fourths cent and while we try to get a fair margin of profit on them all, yet we actually lose money on a great many of the kilowatt hours we supply at the highest prices.

Now, how do we distinguish between the kilowatt hours that cost 20 cents or 30 cents, and those that cost only one-half cent. In the case of a customer we have a definite address or location and know exactly what happens when he comes on to the system and uses current. In the case of different lamps we know very clearly that to supply one lamp for a year will probably take only 60 pounds of coal and to supply another over half a ton, so that the first lamp may be supplied at the cost of half a ton of coal cheaper than the second, if the other expenses are the same. The kilowatt hour, however, while more exact and definite than the customer or the lamp, is more a definition than a concrete quantity and the variation in the cost must be considered more carefully.

In the general analysis of rates which has been my particular work with the Boston Edison Company for some years, I have a great many methods, but I can perhaps make the matter clear most quickly by explaining what we did in 1904, in the case of a very large customer, who was desirous of taking current from us.

This particular customer had the equivalent of 10,000 to 15,000 lamps connected, of which he would probably use about 8000 at any one time. To supply him, therefore, we had to assign about one-tenth of one of our new turbines, together with the proportion of the steam piping, boilers, pumps, condensers, coal handling apparatus, and station building, also switchboard at the L Street Station, high tension cable from L Street Station to switchboard in Boston substation; at this sub-station, storage battery and underground cable and duct from the sub-station to this particular customer. In this particular case most of this apparatus had been already ordered in anticipation of the regular growth of business; but when this customer comes on and uses the proportion of the turbine, boilers, etc., no one else can use them at the same time, hence we must get from this particular customer each year the depreciation and the interest or dividends on their cost, since, of course, the electrical companies do not sell us dynamos, nor the boiler companies, boilers for nothing, and our stockholders do not give us money to pay for them unless they are assured of a reasonable return on their investment.

In addition to the interest and depreciation, and by the way, taxes, which last year amounted to over 38 per cent. of the money we paid our stockholders, there are various other expenses which will be increased before we are ready to supply this new customer. We must keep the steam pipes hot from the boilers to the turbine even when no current is being turned out from the dynamo. We must keep men by the turbine all the time to watch it and keep it oiled. We must keep a water-tender at the boilers to see that the water does not get low in the boilers and cause trouble. We must keep men by the switchboard all the time to adjust the pressure that the lamps may neither be dim nor burn out and there are various other expenses that will be required to get ready and keep ready to supply this customer even if no current be passing out over the lines but would not be required if we did not have to keep ready. I will not describe all these expenses, because this paper is not on the subject of costs, but on the methods of making prices. I may say, however, that we figured that it would cost us, including the interest and depreciation on the plant required and the other expenses, something like $24,000 per annum more to keep ready to supply this customer, than if we did not keep ready, and unless we get this sum for the keeping ready of this machinery we are out of pocket.

Now let us see what the cost is per kilowatt hour. First, let us take a case so extreme as to be absurd, but nevertheless instructive, and suppose that this customer used just one kilowatt hour per year. We may neglect the amount of coal used for one kilowatt hour, and we find that the total cost of that kilowatt hour was $24,000. Let us, however, take an extreme, but not an absurd case, and suppose that this customer had his own plant but wanted central connection from us in case of a breakdown, and during one week of the year he shuts down his own plant and uses 24,000 kilowatt hours from us. The cost of the coal is something like one-half cent per kilowatt hour on our turbine plant and the coal for these 24,000 kilowatt hours will, therefore, cost us something like $120. Adding this to the $24,000 per annum that we pay for keeping ready and dividing by the kilowatt hours actually used, we find the cost a little over $1 per kilowatt hour.

Now take an ordinary case, a case similar to many we have on our books of other customers and suppose that this customer should use his light about one hour per day and should use about 116,000 kilowatt hours. The cost of these for coal and for the renewal of the incandescent lights when they get dim or the trimming of the arc lights would be about $2,400, making the total cost, including the $24,000 per annum for keeping ready, about $26,400 or about 17 cents per kilowatt hour.

Take still another case and suppose this customer used his lights about ten hours a day, say 1,200,000 kilowatt hours in all. Adding the cost of the coal and lamp renewals to the cost for keeping ready and dividing by the number of kilowatt hours, we find the rate to be about 3.2 cents per kilowatt hour; and, of course, if the customer should use his lights twenty-four hours per day the cost per kilowatt hour would be lower still. The above analysis has been for a customer with sufficient lamps to require one-tenth of one of our turbines. It is, however, perfectly obvious if we consider a customer who only requires one-ten-thousandth of one of the turbines, say a customer with ten or twelve lamps, that most of the cost will be in the same proportion and the same per kilowatt hour as in the case of a large customer.

Now, how shall we take care of this tremendous difference in cost between the customer who uses our investment steadily and the customer who uses our investment only a very short time? The obvious way is to charge him by the method known as the Hopkinson System, and instead of making a charge of so much per kilowatt hour, we make the charge in two items. One item on the bill is the fixed charge, which is made in proportion to the amount of our investment that the customer uses, independently of how long he uses it. This, in our case, is a charge of $60 per year for each kilowatt of investment that the customer uses. In addition to the payment of this fixed charge, which corresponds to our fixed expenses, the customer pays a rate of only 5 cents for each kilowatt hour that he actually does use. The result is that the customer pays in proportion to our costs. These figures are not by any means the exact costs, since when we compare our figures of costs with the prices of $60 per kilowatt and 5 cents per kilowatt hour, we find that the $60 a year is too small, especially for our small customers, while the 5 cents per kilowatt hour gives us a tremendous profit as compared with our operating costs after excluding our fixed charges. Still the figures that we have actually adopted, work out in practice much better than the theoretical figures. One reason is that we cannot insist on all our customers paying according to this Yearly Rate and in fact the majority pay, and prefer to pay on the very simplest possible plan, and pay so much per kilowatt hour, and we give this option largely for policy's sake.

Of course, charging so much per kilowatt hour means that some customers are very much more profitable to us than others, but the case is not so bad as it might be, because while the customers who use our investment only a very short time and pay by the kilowatt hour, pay us only a very small amount towards our fixed charges, yet the fact that they only use our investment a very short time means that we have a very good chance of selling the use of that investment two or three times over. Say our investment costs on a small customer are $90 a kilowatt per year. If such a customer pays us 11 cents a kilowatt hour, then, practically speaking, 10 cents an hour is available for our fixed charges, and if the customer uses the investment 800 hours a year this gives us $80 a year towards fixed charges of $90. Then if we sell the use of that investment to three customers, we get the $90 for our fixed charges only once.

If we sell it only twice we lose. If we sell it four times it balances some of the losses that occur when we only sell it once or twice.

The result of the two optional rates, one a per kilowatt hour rate and the other the Hopkinson rate, are pretty nearly what we want, since though we lose very heavily on some of our 11 cent customers, yet on some others we make a good profit. When, however, an 11 cent customer uses our investment for so long a time that he would become abnormally profitable, then he has the option of taking current on our yearly rate on the Hopkinson System and getting a much lower rate per kilowatt hour than 11 cents.

At the same time such a customer uses our investment long enough so that the profit on the 5 cents charge makes up for the loss in charging him only $60 per KW fixed charge and the two features, or rather, the two rates balance up pretty well.

In addition, however, to the difference in costs between customers who use our investment a long time and those who use it only a very short time, there is another difference in expense in that a large customer costs very much less to supply per kilowatt hour or per kilowatt, than a number of small customers.

For certain expenses the proportion of costs between large and small is about the same. Our costs for turbines, for instance, are about the same per lamp whether a customer has one lamp or ten lamps, or a hundred lamps or a hundred thousand. The cost of transmission lines, by which I mean the big lines that run from L Street to Head Place, or from L Street to Zeigler Street, is about the same, whether a customer has one lamp or a hundred thousand lamps. This is because for such items as turbines or transmission lines we make the apparatus as big as we can have it without any question of what we are going to supply over it, since we have business enough to load up the largest turbine and the largest transmission line to its economical limit.

When, however, we get beyond a certain point the costs are not the same for different size customers. A pole line for a hundred thousand lamps costs almost nothing per lamp. A pole line for a thousand lamps begins to be expensive, while a pole line for ten lamps or one lamp is almost prohibitive in cost. In other words, the cost of manufacturing electricity and delivering it in wholesale quantities at a single point is one thing, while taking this electricity and distributing it retail makes a very great additional expense.

Now take one of our practical cases. When the Town of Wellesley comes to us and wants us to deliver our current wholesale at the town line, letting the town distribute it to its citizens in the town, the Edison Company is relieved of a very large amount of expensive distribution work, and naturally is willing to make a much lower price to the Town of Wellesley for its wholesale supply, than it would if the Edison Company had to distribute the electricity retail in the Town of Wellesley, or than the Edison Company does make in the adjoining Town of Natick, where the Edison Company has to pay the distribution expense.

This is the whole principle of wholesale and retail, the only difference between the Edison Company's business and other businesses being a question of degree.

Some items, such, for instance, as copper and coal, and flour, cost perhaps only 20 per cent. or 30 per cent. more at retail than they do wholesale.

Transportation has differences that are tremendously greater than anything we make. The government charges $640 a ton for sending a letter, while a railroad will ship coal for 50 cents a ton. In each business, it is a question of costs and in our business the difference between our wholesale and retail prices depends on the difference in costs between distributing wholesale, where we can make our turbines and lines, and everything of the most economical size, and of distributing retail where we have to have a pole that can carry a line for 1000 kilowatts, and yet the customer wants to pay for only 1 kilowatt or 1-20 of a kilowatt.

Now, our wholesale rate is very much less than our average rate, and even than our average costs, but it should be kept clearly in mind that the small customers lose nothing in any way from the fact that the wholesale rate to large customers is less than the retail rate to the small customers. The use of our service by large customers at less than the average price does not add anything to the expense of supplying small customers, but in fact enables us to supply our small customers at a less rate than would otherwise be necessary.

The big department stores get no special advantage in competing with the small store by reason of our low wholesale cost for current, since the large stores already have the advantage of being able to put in a plant.

For the amount of current that would be used by a large customer who gets our wholesale discounts, the cost of making so large an amount of current for himself in an isolated plant, would be only ten or fifteen per cent. greater than our price to him. At first sight, therefore, it might seem that this ten or fifteen per cent. represents an advantage that the wholesale customer gets, as compared with his small competitor, over what he would get if we refused to make a wholesale rate. However, the wholesale customer gets his current, we will say fifteen per cent. cheaper than if there were no central station supply, but if the retail customer had to make his small amount of current for himself, it would cost him, not fifteen per cent., but one hundred per cent. more than our price, so that the retail customer gets 100 per cent. and the wholesale customer only 15 per cent. advantage from the fact that the Edison Company exists.

Even take the worst case and suppose that we refused to supply the wholesale customer except in retail prices, and did supply the retail customer. Even in this case the loss of the wholesale business would not decrease our expenses in proportion to the decrease in income, so that if we lost the wholesale business even at the present low rate, the cost of the retail business would be increased by the amount of the loss on the wholesale business.

Should the cost of the business increase, it would be necessary to increase the cost to the small store, which would be increased by, say, 30 per cent. or 40 per cent. On the other hand, the cost to the large store could not be increased more than 20 per cent. because the large store would immediately put in its own plant at a cost of only about 20 per cent. more than it had been paying us. The result would be that the small store would not be as well off as under the present conditions.

There is one case that frequently comes up, and that is that in an office building, the owners buy wholesale at the same price that, for instance, a town would buy, but the expenses of distribution from the basement of an office building to the offices are much less than they would be between a central point in a town and the final consumer along the roads.

It follows, therefore, that when the Edison Company goes into a big office building at the request of the owner, it could sell to the tenants retail at a very much lower price than it could in the towns of Natick or Wellesley, though, of course, not quite as low as the wholesale price at which it would sell to the town or to owners of the office building.

If, therefore, we followed out completely the theory of determining the cost in each particular case we would have a different cost in each town and in each block of buildings, since, when we have a very great many customers side by side our costs of supplying them are much less than when we have the same number of customers spread out over a large area.

If, however, we should attempt to make a different price in each section and each block according to the number of customers we had, or according to any other local reason, the difference would be very unsatisfactory and, fortunately, there is another feature in our expenses and costs that enables us to take care of this difficulty.

The reason is that in addition to all the expenses I have outlined that are actually increased every time a customer comes on our line, there are a great many other expenses. For instance, when we lay a main in a street we have at first only one or two customers on the street, and these perhaps use only 1 per cent. of the whole capacity of the main. It would be bad engineering to put in a main so small that whenever a customer came on it had to be dug up and replaced by a larger one and yet, the excess cost of the large main put in, looking towards the future growth, can hardly be charged to the particular customer who uses it first, but must be spread over the whole business, or rather charged to those customers who, on the whole, get the benefit.

Another expense of this nature is the fact that many of our engines are of older type than the modern turbine and involve considerably higher coal and labor cost. In our work, we aim at keeping the total expense at a minimum. If we should throw away these old engines and put in turbines, we could reduce our coal expense, but would increase our depreciation charge by an even greater amount, hence, we run the old engines until we can afford to scrap them. But it would not be fair to charge the extra coal due to running these old engines, only to the old customers for whom these engines were put in, and to give the whole advantage of the turbine to the new customers, hence this extra cost forms an item which must be distributed over the whole business and cannot be ascribed to any particular customer. When the City of Boston abandons a street and makes us abandon our conduits without compensation, that again is an expense that cannot be ascribed to any particular customer. Besides these three sample cases, there are many similar expenses.

I may say that a great deal of the money that we collect from our customers goes towards paying our expenses that cannot be said to be the cost of any particular customers, but of all the customers. In other words, such items are for the general good of the city, or of all our customers, and while part of our whole costs, they are not the cost of supplying any particular kilowatt, or any particular customer, or any particular lamps. These items of expense that cannot be said to be for any particular cost are what we might call unclassified expenses. They have to be paid in some way and we arrange our prices so that the burden of these items of expense shall be distributed where they will bear the least heavily.

In the case of the tenants in a large office building whose owners desire us to deal with the tenants direct, we find that since the cost of distribution over an office building is small, we could supply these tenants at a less price than we could supply in a very large and widely scattered community such as a country town.

We find, however, that when the owners of such a building want to supply the tenants themselves instead of letting us supply them, that the owners, by reason of their not being as skillful and efficient at the business of electricity supply as we are, have to charge the tenants of such a building just the same, or practically the same, as we would charge in a country town.

Therefore, when the owners of a large building want us to supply the tenants direct, we charge the tenants just the same as if they were in a town or in a small building. The tenants do not suffer in any way and prices are kept uniform so that there is no discrimination, while the profit we get in such cases helps pay the unclassified expenses.

The next question is that of power and why should power prices be different from those for light.

We use the same turbines, transmission lines, mains, meters, etc., and two customers may be using the same amount of current side by side, and the one that used it for power gets a much lower rate than the one who uses it for lights. Why should this be so?

There are two reasons, or classes of reasons, for this.

One is that power service requires much less care and attention than lighting service. For one thing we do not have any expense for renewal of incandescent lamps. We do not have to regulate the pressure as closely for power as we do for light, and that means that even when the current is supplied over the same wires, that the expense of the extra good regulation required for light should be collected as far as possible from our lighting customers.

These items, however, while important, are not the most important. The really important difference between light and power is that power is called for at any time during the work day and, therefore, the result of all our power business, even if individual customers only use their portion of our investment a short time, is that our station and transmission line investment and much of our distribution investment is used steadily ten to twelve hours a day.

On the other hand, the same number of lighting customers, instead of coming on at any time from 7 A. M. to 5 P. M., will practically, all of them come on some time between 4 P. M. and 6 P. M. in the winter, and will result in requiring a very much larger investment in proportion to the kilowatt hours used. We can, therefore, afford to supply intermittent power at a lower rate than we can supply intermittent light.

Before arriving at our actual power prices, however, we have to take into consideration the other feature that I have spoken of, that there are a great many of our expenses which are for the general benefit of all customers, but cannot be classed as the expenses of any particular part of the business. Now, the customers that get the greatest benefit from our system are our small and intermittent power customers. The power customer that uses only a little power gets just as much benefit from our service for each kilowatt hour that he uses, as a lighting customer, and we, therefore, charge him the same price, although we get a very good profit on such customers as compared with our costs.

When, however, a power customer becomes even moderately large sized, or a moderately long hour user, he begins to be able to get his power in other ways. In other words, he ceases to get as much benefit from our service as a small user and cannot afford to pay as high a price per kilowatt hour.

We, therefore, reduce his rate so that he can still afford to use our service, although he is not as profitable as a smaller customer in proportion to the kilowatt hours used. On the other hand he is a very profitable customer indeed, in proportion to the investment required.

The foregoing discussion has brought out the four most important principles that are used in making prices and these are:—

First:—That the customer who uses the investment a long time is much cheaper to supply, and is entitled to a better rate than the customer who uses the investment only a short time.

Second:—That a large customer who does not require any large expenditure for distribution in proportion to the amount of service rendered, can be supplied at a very much lower rate than small customers who require a very large distribution expense.

Third:—The third is in one sense an extension of the first principle, in that a customer who uses the service for power, even if the individual customer uses the investment a short time, produces the same result on the station and, to a certain extent, on the distribution system, as though he used the investment a long time, and can, therefore, be supplied more cheaply than if the current is used for light.

Fourth:—That there are a large number of expenses which cannot be classified and ascribed to any particular customer, or class of business, but must be paid somehow. By proper distribution of these unclassified expenses, we are enabled to smooth out our prices and rates and make them far more simple than we would otherwise have to do, and also make them more uniform as between individual customers.

Having described the principles that we have used in making our rates, I will next refer to some of the things that we do or do not do and give the reasons that have actuated us.

One question that has been frequently asked of us in the last few years is, why we have made all the reductions in prices to the short-hour consumer and have made hardly any to the long-hour consumer.

A few years ago our ordinary lighting rate was 18 cents per kilowatt hour and we have, by gradual steps, reduced this first to 15 cents, then to 12 cents and now to 11 cents, and during this time the Hopkinson rate to our small long-hour consumers has remained at $60 a year fixed charge and 5 cents running charge.

If the 18 cent rate and the Hopkinson rate balanced each other four years ago, it would look as though we might be losing money on all of the 11 cent business now, or rather, on most of it.

The case is very similar to the old woman who sold apples and said that she lost a little money on each apple that she sold, but she sold so many that it more than made up the difference and gave her a little profit at the end of the day. Though we may apparently lose money on the 11 cent business, yet we do not actually lose money, except on a small proportion of our customers. What happens is that the customers who pay 11 cents, pay only a small proportion of the unclassified expenses, and these unclassified expenses are almost entirely borne by the customers who take the yearly and wholesale, and power rates.

From some points of view it does not seem quite fair that a drug store should pay so much larger proportion of the unclassified costs than the residence, but on the other hand, it is evident that the public prefer a simple, uniform rate and the only way that we can have a simple, uniform rate is to let the drug store and similar business pay a large proportion of the unclassified expenses.

Another thing that the Boston Edison Company does not do and that many companies do, is to make a discount for cash.

A cash discount it must be remembered is not really an allowance for prompt payment, but is a penalty for slow payment. If it were really an allowance, it would be a most improvident one, for the rebate usually amounts to at least 5 per cent., and often to 20 per cent. or more, while the interest that corresponds to getting paid in ten days instead of thirty is only one-third per cent., and the cost of collection and bad debts that are saved by a cash discount system will hardly bring the warranted difference up to one per cent.

The real question, therefore, is shall we speed up payments by a penalty for slow payment, *or* by a thorough going collection system with prompt and persistent though polite pressure whenever bills are not paid promptly?

We believe the latter to be the best policy. More could be said for cash discounts if it were possible to enforce them absolutely, but I do not believe it is possible to make the cash discount rule apply to the government, or to the city, or to the large department store, or to the man who goes out of town for a fortnight just when his bill comes in so that he can prove to you that the bill was not delivered to him by Uncle Sam until after the period had elapsed.

We believe that the better feeling with our customers, produced by not having a cash discount system, more than balances the small saving from speeding up the collections.

On the other hand, a very good argument can be made for the cash discount. No customer who intends to pay his bills can offer any serious objection to it, even though he may prove that its enforcement in a particular instance is a hardship. If most of the bills are paid within the limit, the expenses of collection are reduced to a minimum; if many are delayed, the penalty helps pay the cost of collection.

Personally, I believe in an efficient collection system rather than the cash discount, but I have not had enough experience to feel sure.

Another question that often comes up is in regard to the dollar minimum. The theory of the dollar minimum is that no customer should be taken at an absolute loss. We can afford to take a customer without a fair margin of profit, if we cannot get him otherwise, so long as we get something over and above bare cost to pay our unclassified expenses, but if a customer comes to us and asks us to connect our service and maintain it, and make out the bills and mail them to him, and only uses one cent's worth of current a month, it is obvious that all the expense of maintaining that meter, etc., etc., must be paid by other customers. This is not fair to the other customers and it is, therefore, necessary to have some minimum so that no customer shall actually cause the company to collect from other customers the money that it spends in maintaining the first customer. The dollar minimum is applied with this end in view.

Another question that is often brought up is as to whether a company that has facilities for supplying both alternating and direct current should make any difference in the price.

When electricity was first brought into general use, direct current was decidedly cheaper to supply than alternating. As the art progressed and as the stations spread out, it soon came to be the case that for certain districts, and for some kinds of service, direct current was cheaper and for other kinds of service, and for other districts alternating current was cheaper. Further, there is a continuous change going on and while direct current may be cheaper in one place today, tomorrow we find that alternating current is cheaper.

Our theory in Boston is, that so far as possible we should not complicate the customer with these differences, and so far as possible we charge the same price for alternating current and for direct current. In some cases we make considerably more profit than others to go toward unclassified expenses. but for the sake of simplicity, we charge the customer the same rate.

As a matter of fact, we have only a few locations where we can give customers the choice between alternating and direct current. In most locations we have only one kind of current, and can deliver the other kind only at a practically prohibitive cost, but the price is the same for one kind of current as for another, if we can furnish at all at a profit.

Another question that is often brought up and that is why, as long as we have machinery lying idle in summer and in the early morning, we do not make a special price in order to have that machinery used.

Electric vehicle people, for instance, are all the time coming to us and asking for a special price, in consideration of their agreeing not to use current at the time of our peak.

The reasons why we do not make any concession in this regard are as follows: the first being an Irish reason in that we already do do it.

If a customer takes service from us at our ordinary lighting rate, he pays 11 cents, but if he takes service at our so-called yearly rate he pays a fixed charge and then gets all the electricity he uses at 5 cents, or less than half price. We have thousands of such customers, and if there were really any general demand for a low rate for current "off the peak" all that is necessary is for the people who want it to go to these customers of ours and get them to re-sell the electricity at 6 cents, making 20 per cent. profit. In fact, by reason of our power rate and wholesale rates, there are thousands of places than can sell current at 3 cents or less, in Boston, "off the peak."

While this feature of our price does take care of a great deal of vehicle charging in Boston, it does not satisfy the people who want us to put in a separate line and new service for them, and sell to them at a low price, because they will use it "off the peak." If we have to put in a special service, it is clear that so far as that service goes, and probably as far as the transformer and part of the distributing system goes, such supply is not "off the peak" in the sense that no investment is needed. Even in the case of the customer whose service is already in, but who pays 11 cents for all he uses, we must remember that the only reason we can afford to let him use current at the peak at 11 cents is that we know from experience that we shall also sell enough current "off the peak" at 11 cents to bring us out whole, and a lower "off the peak" price therefore means an immediate cut in income, unless we could devise some means so that our present "off the peak business" shall still pay full prices.

I do not mean that it is not wise to encourage "off the peak" business, since whenever we can fill up the valleys in our load curve, it means more income with no more investment.

On the other hand, we must sell, and are today selling, a good deal of current "off the peak" at much more than bare operating expense in order to be able to sell "on the peak current" at 11 cents. If we make any lower price for "off the peak" than we are today making, we must remember that it will cut off some of our present income, and whenever we consider any "off the peak" price, we want to be shown that its final result will be favorable to the whole of our business.

Another question that is often asked is why we do not make a lower rate for supply close to the generating station than for supply at a distance. The reason, of course, is that it is better to charge the same rate everywhere, irrespective of location, if we can. We will not go anywhere unless our regular rates give us something towards the unclassified expenses over and above the expenses that are actually increased by supplying the business, but if we can afford to supply at all, we make the same rate. This is not unfair to anyone because the people in South Boston, close to our station, now get their service cheaper than they would if we did not have our plant there, and so long as they get it cheaper than they would if the Edison Company did not exist, it seems hardly fair that they should want to take any advantage from the accident (accident so far as this particular point of view is concerned) that we happened to locate in South Boston, rather than East Boston.

I could, of course, spend hours going over every detail of our rates. I have, however, only meant to discuss the principles.

While our rates may seem on the face of them complex, yet I wish you would remember that the only reason that they seem complex is because they are so simple that we can make at least an attempt to show the principles on which they are worked out.

I was responsible for the introduction into this country of the Wright demand system of charging, on which the Boston Edison system is based, and have therefore heard a great deal about complication; but our system is not as complicated as the United States Postal System, if one should attempt to explain the reasons why first-class rates should be exactly thirty-two times as much as second-class, etc.

It is not as complicated as the Boston water rates.

It is not as complicated as telephone rates.

It is not as complicated as railroad rates and classification.

Before anyone calls Boston Edison prices for electricity complicated, I will ask him to name an article that is sold both wholesale and retail in qualities whose costs vary by several hundred per cent., an article that the customer may take delivery of at any time, and in any amount he wishes, an article whose price is made so that the price will stand for several years without increase and whose price is not far more complicated than Boston Edison price for electricity.

Before you call Boston prices complicated, I would ask any other electric company to give *all* its rates. Our rates are six in number: viz., short term and long term, power and street lighting, and two more rates for long term agreements. They are printed on six small pages and cover business from $1 to $5,000 per month. No special rates are being made, or will be made. Other companies have published rates far longer and more complicated than ours, and none as short or as simple except companies that have not published all their rates. A rate book is complete if it gives all the rates that will be used for new business and for existing business when existing contracts expire.

We have simplified our prices a good deal in the last few years, and in some directions we hope to simplify them more later, but if we made our prices too simple they would be unfair, just as a hotel's prices would be unfair if it charged the same price for a boiled egg and a porterhouse steak. A simple article like copper can have a simple price but a complicated service like a railroad or hotel or electric service must have some complications in order that the price may be as fair.

THE PRESIDENT. Gentlemen, that is a mighty good paper, and one from which all of us can get very much information. I hope that it will prove another means of educating the public as to what can be done in the equalizing of rates and assist us all in this most important matter. In the absence of the author, Mr. Gibbs will undertake to answer any questions, and besides we have two or three members who will discuss this paper to some extent. Before commencing this discussion let me say that the Association is not responsible for the pictures that have been taken here this evening, but I can guarantee that the photographer is perfectly reliable.

The first member that I will call upon to discuss the paper just read is Mr. Alex. Campbell of New London.

MR. ALEX. J. CAMPBELL. Mr. President and Gentlemen: If there was any one touch that could be added to this very comprehensive paper by Mr. Hale, that touch was to have Mr. Gibbs read it, and I submit to you that there is very little left to add.

I am going to suggest to these gentlemen, who have the paper before them that they turn the pages with me and make occasional marks and marginal notes, indicating the important points Mr. Hale has made and in that way I hope perhaps the paper, already valuable, may become more so.

Mr. Hale has said that the Boston rates are simple and not complicated, and I want to bear testimony to that fact, although the statement may surprise some of you gentlemen who have only glanced at the rates. They are, moreover, very flexible. I applied them very recently under totally dissimilar conditions to Boston, and found that in a small town we could use one of the Boston rates in quoting to stores, in submitting a proposition to a large hotel, and again the same identical rate in submitting a proposition to supply current to a municipal plant. I think you will agree with me that any one rate which is so flexible and so comprehensive as to be useful in all those three cases must merit your very careful consideration. I have also applied them in some still smaller communities with very slight modifications. If any gentleman here believes that the Boston rates are too complicated for his conditions I think it can only be because he has not studied them.

I feel that the importance of having a general agreement in our rates and in our methods of charging is perhaps underestimated. It seems to me that the time is coming, particularly as the idea of public service commissions extends, when we must justify every rate we make, and if all of our New England Section could join in rates that were almost identical in principle, and at least very similar in fact, it would strengthen our position very greatly. I venture the prediction that if we got into this matter, and the more we go into it, the more we will be content to come towards these same Boston rates.

Mr. Hale has dealt in principles; I want to point out, if able to do so, some of the applications, the direct applications, of those principles. I think there are in his paper two main ideas that it would be well worth while for you gentlemen to carry home. The first one is this: We are all agreed that it is easy enough to determine our average rate. We generate or sell so many kilowatt hours per year, and for those kilowatt hours we receive a certain sum of money. If you divide the one by the other you get the average rate. The thing that Mr. Hale wants to bring out is that while the average rate is a simple matter the difficult problem is how to apportion, how to divide charges among our different classes of customers, so that we can secure the different kinds of business at widely different prices and yet deal fairly by the public. That is what I would call his first main idea. The second one is this: Electric light companies have gone enough into the matter of making rates to have arrived at a pretty fair idea of the underlying principles. Unfortunately these theoretically correct rates are more or less complicated and difficult of application. In addition to that, the public demands something that is extremely simple. They want to buy so many kilowatt hours and pay so much per kilowatt hour. We know that a rate of that kind is inherently wrong, but the public demand for that kind of rate is very strong. Therefore, we have to effect a compromise between what is theoretically correct and what is simple, and that, I think, is Mr. Hale's second idea that he wants to bring out.

If you will turn to page 135, you will find the first idea well expressed in the third and fourth paragraphs. You will also find that same first idea expressed in a somewhat different way in the paragraph beginning on page 136. And now won't you all mark that paragraph, and when you get home read it and then again re-read it? He brings out by means of a very excellent illustration the fact that you cannot charge an average rate. He does it on page 137, the first part of the last paragraph, in which he says: "It is perfectly clear that we cannot depend solely on averages in any particular case any more than we, ourselves, would be satisfied to have the total payrolls of our various companies divided by the total number of employees so that each employee should be paid exactly the same salary." I think we all feel the force of that illustration, and it might be convenient to quote to the public at some time.

I would call your attention to the twenty-ninth line on page 138, beginning "In other words, etc." There is an idea there of what municipal enterprises have been successful, which you may find handy at some time in dealing with that question.

Mr. Hale again illustrates very aptly and well why there should be a difference in rates. He does it in the last paragraph on page 139, and I am quoting from the middle of the paragraph, where he says: "But I do wish to state most emphatically that there is just as much reason for differentiating between the kilowatt hours that cost the company

20 cents, 30 cents and 50 cents each, and even more, and the kilowatt hours that cost the company less than one-half cent each as there is between customers and lamps." I think most of us in making rates have not ourselves fully appreciated the difference in the cost to us, and how some of the kilowatt hours cost us a great deal more than we are charging; while on the other hand, and this is the point I want to bring out, there is a very large amount of business that can be had at rates that we today do not dare quote, simply for the reason that we do not know that we can afford to do so. Some of the business that pays best is the business at extremely low prices, but the conditions must be such as to make those prices profitable. But I think we have had too much in our minds the idea of prices, and when you begin to talk low prices to a central station man he becomes frightened, not because business is not profitable, but because he does not know that it is profitable. I think we will each of us find a very large volume of business in our vicinity or territory that can be had, and the only bar to getting that business is the fact that we do not realize that it is profitable.

We sometimes have to justify the service charge. If you are ever looking for an argument I think you can refer to the last paragraph on page 140. There is another page which should be borne in mind.

We have had very much the habit of considering that our fixed costs consisted of interest and depreciation alone, and I think a good many of us who have had to talk to customers were a little weak when it came to justifying a considerable fixed charge, because we only took into account, or mainly took into account, interest and depreciation. Mr. Hale has made very clear that there are a great many other items that should be considered, and those you will find set forth in the first paragraph on page 141.

Now he touches upon what I will call the second main idea in his paper, which is that the actual rates that we must finally give must essentially be a compromise between those that are theoretically correct and the simple rates demanded by our customers. That he mentions when he expressly says that a customer prefers the simple rate. You will find that near the middle of page 143. I think he has hit it very well in the second paragraph on page 144 when he speaks of the result of the two optional rates, and if I understand the situation clearly, I think the Boston Edison Company has come to that conclusion through some pretty hard knocks of experience. If I understand their rates they have first the simple rate of 11 cents a kilowatt hour. Nothing could be more simple, nothing could be more clear; it is a perfectly straight line, and there is not even discount for cash. For those customers who want simplicity there could be nothing better. On the other hand, there must be another rate, therefore they have an optional rate, which admirably takes into account the customers who are entitled to a better rate than they can get at 11 cents. If you gentlemen will carefully consider that problem I think you will come to the conclusion, as I have, that those two systems of rates, the simple flat charge per kilowatt and the rate based on a fixed charge plus a low price for current, meet practically every case that can come up, except possibly power.

On page 145, about the middle of the page, Mr. Hale gives some very good reasons for wholesale discounts. Of course, that is the simplest form of discount, and it is one with which the business world is familiar.

I also commend to your attention the fact that government rates, postal rates in particular, are fearfully and wonderfully constructed. If you ever want an argument or a reason to justify differential rates just buy a little postage stamp book, on the back of it read over and consider the government postal rates which are there given.

On page 146 Mr. Hale has a very ingenious argument, showing the advantage that the small customer gains by taking service from the central station.

We are sometimes asked why we can afford to sell electricity, identically the same current, cheaper for power purposes than for lighting. I think Mr. Hale has answered that all through his paper, but particularly you will find his arguments in the first two paragraphs on page 150.

I would also call your attention to some things he has said on page 152.

It is very difficult to bring about an actual and specific application of the ideas, contained in a paper of this kind. I believe this matter of a general agreement, or approximately general agreement, on rates, especially to us here in New England, where we are very much of a unit, is a matter of importance, and I am going to make a motion in a moment that may help bring this matter to a head. There are something over 100 class A members, that is, central stations, and I do not think I am much out in allowing an average of twenty special rates per central station. If so, these central stations represent between 2000 and 2500 rates. I submit to you, gentlemen, that if I am anywhere nearly correct, and I believe I am underestimating rather than overestimating, these rates represent a danger before us here in New England, and it should be guarded against. As a first step, Mr. President, in trying to bring this matter to a head, I make this motion:—

That the Secretary be directed to write to all of the Class A members of this Section, asking them the following questions:—

1. How many special rates do you give?
2. Would you like to abandon these special rates and adopt one, two or three published rates if you could find the way to do it?
3. Will you take an interest in this matter of bringing about a general agreement in rates in New England?

The President. Gentlemen, you hear the motion made by Mr. Campbell, that the Secretary invite information from the various Class A members as to their rates for service, etc.

(The motion was adopted.)

The President. Is there any other member present who would like to discuss this paper further? There is one other gentleman entered for this discussion, Mr. George E. Claflin. Is he present?

Mr. George E. Claflin. My business takes me about the country a good deal, and into the smaller plants, and it occurred to me that Mr. Hale's description of the farmer with his calf is about the way that some of the companies have been making rates in some of the smaller places. It seems to me that this matter of special rates is extremely important, and I believe that with a certain amount of work it can be cleared up. I have had some experience in smaller cities, where we have gone through the rates thoroughly and developed a system along the line of the Boston Edison Company, modified in a number of ways, which, however, are not particularly radical. It seems to me that the important point in developing those rates is to so arrange them, that we can give the customer automatically a lower rate when he gives us a better load factor, and further than that, can give him a lower rate as he becomes a wholesale customer. Those are the points that are brought out in Mr. Hale's paper, and they will help us in improving the station load factor, which I don't believe we all thoroughly understand the full advantage of. The question of our rate to our customer is dependent upon our cost, and that can be reduced by improved load factor and by the diversity factor, which Mr. Insull brought out in his remarks at the recent dinner at The Brunswick. The results of improved load factor are really remarkable, particularly in the smaller plants, which have but little load at certain hours, and I don't think we realize how low a rate we can make to people who will give us that load at those times. Our problem is a little different from the Boston Edison Company, which has the larger field, and therefore we have got to search out those people and be prepared to give them the rate that will get the business. I have known cases in which a rate, as pointed out in the paper, of even considerably less than the average cost, has materially increased the net earnings of the company, bringing down, perhaps, the average rate of income per KWH, but at the same time the average cost in greater ratio. I believe this plan of endeavoring to get a uniform rate, working towards a uniform rate in New England, is an extremely valuable plan, and that it can be worked out.

THE PRESIDENT. Are there any other gentlemen here who would like to discuss this paper? If not, I will call upon Mr. Burleigh, who has a matter to submit to the attention of the Association.

MR. BURLEIGH. Mr. President and Gentlemen: I want to say just one word before bringing to your attention a little matter which I would like to present for your consideration. I feel that while Mr. Hale is to be congratulated on the excellence of his paper, you also are to be congratulated, and this Association, as well, for having placed before you and in your hands material which will enable you to present equitable arguments to your legislature or legislators, municipalities and electric commissions; whereby they may be enabled to realize and appreciate the legitimate excuse that you have for presenting apparently different charges for different classes of service. I wish to offer for your consideration the following resolve:—

Whereas, the success of this convention has been entirely due to the interesting and instructive papers presented and the entertainment furnished, it is

Voted, that the New England Section, on behalf of its members and guests, express to the authors of these papers its most hearty appreciation of their efforts, and extends its thanks to the President of the Edison Electric Illuminating Company of Boston, for the courtesy extended this Association to visit its plant in South Boston, and for the many other courtesies extended to its members during their stay at this convention; and it is further

Voted, to extend the thanks of the New England Section to the management of the American House, for the courteous treatment given to its members, and for their continual watchfulness for our welfare; and it is further

Voted, that the Secretary be instructed to transmit a copy of this vote to the respective parties herein referred to.

The President. Gentlemen, you hear the resolution offered by Mr. Burleigh. What is your pleasure?

(The resolution was adopted.)

The President. Gentlemen, this is the last opportunity your President will have to say a word to you. I want to thank you all for the courtesies that have been extended to me, for your attendance here and for the close attention that has been given to the papers and to the discussions. I want to thank the Secretary-Treasurer for the very many courtesies that have been extended, also to the Edison Company and many others. I thank you all. Is there any other business? If there is no other business, a motion to adjourn is in order.

Mr. Gibbs. Mr. President: I want to say to the gentlemen before we leave here that I suppose you appreciate we have had a pretty hot convention. We have added a whole lot to the membership since last January, and we have added a lot of members to the list since this convention opened. We have established permanent headquarters for the New England Section. The work has only just begun. You appreciate the value of these papers from what you have heard of them and from what you know you will get out of them later. Now, the value of this Section in its co-operative work with the National Association has not been appreciated. No one has begun to think about its possibilities and about its worth to every man in the central station business—to every man connected with the electrical business. We have over 600 members at the present time; we have adopted the slogan for the next annual convention of 1200 members. (Applause.) It is up to every one of you to get them.

The President. Gentlemen: In closing this convention the orchestra will play the last two pieces on the program.

(After music by the orchestra the convention adjourned with three cheers for President Smith.)

THE

FIRST SEMI-ANNUAL CONVENTION

PROCEEDINGS

OF

The New England Section

OF

The National
Electric Light Association

HOTEL WENTWORTH
NEWCASTLE, N. H.

September 9 and 10, 1909

Officers for 1909-1910

S. Fred. Smith, President, Salem, Mass.
J. E. Davidson, Vice President, Montpelier, Vermont.
C. H. Hodskinson, Secretary-Treasurer, Boston, Mass.
L. D. Gibbs, Assistant Secretary, Boston, Mass.

Executive Committee

J. A. Fleet, Portland, Maine.
J. S. Whitaker, Portsmouth, N. H.
H. T. Sands, Malden, Mass.
A. B. Lisle, Providence, R. I.
A. J. Campbell, New London, Conn.

Standing Committees

Convention.—Chas. L. Edgar, J. E. Davidson, W. C. Woodward, S. Fred. Smith.

Papers.—A. B. Lisle, R. W. Rollins, F. P. Royce, S. Fred. Smith.

By-Laws.—J. S. Whitaker, J. A. Fleet, J. W. Cowles, S. Fred. Smith.

Programs for Convention.—Alex. J. Campbell, H. T. Sands, Frank S. Price, S. Fred. Smith.

Entertainment.—Alex. J. Campbell, J. S. Whitaker, Chas. B. Burleigh, S. Fred. Smith.

Overhead Line Construction.—Sidney Hosmer, W. H. Coughlin, W. L. Mulligan, S. Fred. Smith.

Membership.—J. E. Davidson, Vermont; J. A. Fleet, Maine; J. S. Whitaker, New Hampshire; H. T. Sands, Massachusetts; A. B. Lisle, Rhode Island; Alex. J. Campbell, Connecticut.

Report of the First Semi-Annual Convention of the New England Section of the National Electric Light Association.

The first summer meeting of the New England Section of the National Electric Light Association was held at the Hotel Wentworth, New Castle (Portsmouth) N. H., on Thursday and Friday, September 9 and 10, 1909, under the presidency of Mr. S. Fred. Smith of Salem, and with a large attendance.

On Wednesday evening, September 8, members and guests were received by the officers of the Association and the Convention Committee in the ball room of the hotel, and this was followed by dancing.

FIRST SESSION.

The meeting was called to order on Thursday, September 9, at 10 A. M., President Smith presiding.

The President. It is certainly very gratifying to see so many members and guests present at the first session of the first convention of this Association. Little did any of us realize when the Association was started less than a year ago that we should have so many members enrolled by this time.

The first business on the program this morning will be the President's address. If you will kindly give your attention, I will read what he has to say.

THE PRESIDENT'S ADDRESS.

Members and Guests of the New England Section of the National Electric Light Association:—Being deeply appreciative of the honor conferred in electing me to the office of President of this Association for the first year of its existence, I wish to express to you my sincere thanks. I feel I am safe in saying that no Association, similar in character, has ever been started under more favorable conditions or with a brighter future before it. The forming of this New England Section of the National Electric Light Association has been made possible because of the fact of its being a part of and fostered by the National Association with its many years of growth and prestige, and because of the need of an organization, so general in its character of purpose, that the several electrical associations in New England that have preceded it and which were or are maintaining separate organizations performing practically the same line of work may combine to make one Association of unbounded strength and value. And the tremendous and constant gain in membership that has taken place since its conception demonstrates the wisdom of its promoters.

The electrical industry which we represent, is so extensive in character, that it has proven a prolific field for the forming of many associations of different intent and purpose and yet with a common interest. When this Association, the New England Section, was formed, there were suggestions of early dissolution, all of which intimations, I am glad to say, have proven to be without foundations.

A wave of intense interest in this Association has extended throughout the territory and with the constant and close attention that has been given to it by its officers and committees your Association stands today as the foremost Geographic Sectional Association of the National Electric Light Association, there being several other state sections. Our history is interesting and the methods used in its formation are well worth rehearsing.

During the month of December, 1908, a circular letter was directed to all the Class A Member Companies of the National Electric Light Association in New England, inviting them to become Charter Members of a New England Section to be formed in compliance with Article thirteen, Section one, of the Amendments to the Constitution of the National Electric Light Association. Replies favoring the idea were received from seventy-five Class A Member Companies, asking permission to form the Section.

Under date of December 21st, 1908, formal application was made to the Executive Committee of the National Electric Light Association to grant the necessary permission to form the New England Section, which permission was duly received.

The Edison Electric Illuminating Company, of Boston, in order to get the movement started, sent out invitations to two representatives of each of the seventy-five Member Companies and to the officers of the National Electric Light Association and a few invited guests, asking them to attend a dinner as their guests at the Algonquin Club in Boston, Mass., on December 30, 1908.

Practically every one of the seventy-five Member Companies was represented at the dinner, and also the President, Vice President, and Chairman of the Committee on State and Company Branches of the National Electric Light Association, and a very enthusiastic meeting followed the dinner.

Remarks were made by the officers present from the National Association and the plan of procedure was explained by the President of that Association.

Finally the question of the advisability of forming a New England Section of the N. E. L. A. met with a favorable response and a list of names for permanent officers of the section were presented by a Nominating Committee, appointed by the Chairman, Mr. Chas. L. Edgar, who as President of the Boston Edison Co., was host of the evening. A President, Vice-President, Secretary-Treasurer, and an Executive Committee, one member of which representing each of the New England States, were elected.

At subsequent meetings of the Executive Committee, other standing committees were appointed to carry on the work of the Association.

Following the organization meeting, invitations were sent out by our Secretary, Mr. C. H. Hodskinson, to every member of the National Electric Light Association in New England, in Classes, A. B. C. D. and E., inviting them to join the New England Section. Applications were returned from the following number of members under each class of Membership: 81 Class A., 172 Class B., 15 Class D., and 10 Class E., making a total of 278 applications. This membership was certified to as of January 1st, 1909, by the officers of the New England Section in compliance with article fifteen of the Amendments to the Constitution of the National Electric Light Association.

While it has been impossible to take over in their entirety the membership of these previously existing organizations, principally because of a requirement of the National Electric Light Association that "companies or individuals desiring to become members of a Geographic Section must be members of the National Electric Light Association," yet most of their members have been secured and are now enrolled as Members of the New England Section.

One of these organizations known as the Association of Electric Lighting Engineers of New England, a pioneer association in the electrical field, has disbanded, believing that the New England Section provided greater opportunities and advantages for its members than could a local association without National affiliations.

Such is the early history of the New England Section and the future outlook is exceptionally bright. Today the number of enrolled members is as follows: Class A, 92, Class B, 269, Class C, —— Class D, 22, Class E, 30. A total of 413 members being a gain in membership since the first enrollment of 134.

The officers and members of committees have been extremely interested in promoting the Association's interest and with the members as a whole, represent the progressive element in the Electric Lighting field in New England. With a continuation of the same spirit and effort there will be accomplished in the early future results little expected by the early promoters of this class of membership, and which will prove to the National Electric Light Association that the New England Section is to continue to be the most powerful organized section of that association.

The prestige of the National Association is one of great value to the members of the geographic sections and their record of assistance, which has been bestowed whenever the need existed and their protection when ill advised and strenuous efforts have been made to stifle or break down the business of its members, all point to the value of our connection with the National Electric Light Association.

Your Convention Committee, I think, determined wisely, in holding the first general convention of the New England Section at the Hotel Wentworth, for no more suitable place could scarcely have been found than this very hotel, made famous by being the headquarters of the Russian and Japanese envoys in the recent peace conference, by reason of which, satisfactory terms were devised and approved, and the Russian-Japanese War brought to an end. The program outlined by that Committee will be found full of interest and information, and one which I feel sure will exceed in value your expectations.

Our financial condition which the Treasurer will submit in further detail need not give us cause for alarm, but which calls for future attention, and will be referred to further on in these remarks.

Suitable by-laws have been devised by the Committee on By-laws, copies of which will be distributed to our members for their information and for adoption at this convention.

The question of the number of meetings or conventions to be held yearly has not been definitely decided upon, but it seemed at this time that the best policy was to have a summer meeting to be followed by an annual meeting in the winter. By following this plan the summer meeting can really be an outing for the establishment of cordial relations between members and thus weld together more firmly the fabric of mutual protection and common interest; while the winter meeting will be devoted more to questions of policy and operation.

At the Annual Convention of the National Electric Light Association, held at Atlantic City, in June of this year, your President was in attendance and made a few remarks relative to the progress our New England Section had made and also particular reference was made to the wisdom of allowing municipal employees to become members of the New England Section, for under the present by-laws of the National Electric Light Association, municipal plant employees as representatives of the municipality cannot become members.

These meetings of the National Association are extremely interesting but because of the tremendous growth in membership of late, and because of the varied requirements of the industry it has become necessary to have parallel sessions, which to some extent depreciates the value of the Convention. When it is considered that at these Conventions there is an attendance of over 2000 members it is apparent at once, that, however complete the program may be, important subjects are necessarily abstracted and incomplete discussions ensue. Any Association that reaches that point in size of membership that its fullest intent and purpose cannot be maintained, plans for local organization must be resorted to, which explains more clearly than any other reason why associations like our own become so valuable to the primary association and to one another.

In order to encourage the fullest discussions at this convention, our program was limited to only a few subjects of particular local importance.

One of the matters acted upon at the Atlantic City Convention was a change in the by-laws of the National Electric Light Association so that the Presidents of the Geographic Sections become members of the Executive Committee of the National Electric Light Association.

At the first Executive Committee meeting of the National Electric Light Association held, after the Atlantic City Convention, in New York City, early in August, your President was present. Among many important matters acted upon at this meeting, was one of particular importance to this and other geographic sections and refers to the matter of income. Remarks were made by the Presidents of the several Geographic Sections present, with the result that a committee was appointed to consider the entire subject of geographic section income, this committee to consist of the President and Treasurer of the National Electric Light Association, the President of each Geographic Section and the Presidents of the same number (3) of Company Sections.

It is hoped by your President that such report will be made and action taken by the National Electric Light Association as will provide for additional income beyond that now available for our New England Section.

Under the present allotment the New England Section is entitled to only $2.50 for each Class B member enrolled on the first day of January of each year, which total income is thought to be inadequate for maintaining our proposed program of holding two meetings this year, for printing the proceedings and other miscellaneous expenses.

In order to carry out our plans for this Convention, it became necessary to issue an appeal to the various Class A Member Companies and Class D Associate Member Companies in New England, asking for a subscription to help defray expense of this meeting. This appeal was most heartily and liberally responded to by many of the companies, and which the Executive Committee of your Association most thoroughly appreciate.

Your President has had under consideration the matter of publishing a monthly bulletin, the same as is published by the National Electric Light Association, and by some of the Company Sections, believing there is ample material in New

England to draw from, but our financial condition will not at present admit of such expense.

Should the income of our association materially increase in the future to allow of such expenditure, I believe such a publication would be generally appreciated. It is expected that with the liberal subscriptions made at this time by Class A Member Companies and Class D Associate Member Companies, in addition to the fees received from the National Electric Light Association, the cost of printing the proceedings of this convention is provided for, as well as every other expense. It is incumbent on our present members to assist in procuring those electric light and power companies, as well as their employees, also manufacturers of electrical apparatus and supply men affiliated with our business in New England, who are not now members of this Association to become members of the New England Section, and thereby help to continue to make it the most important Geographic Section of the National Electric Light Association, and obtain that recognition which our importance deserves.

The importance of our industry is continually on the increase and while the technical departments of our business have been subjected to the refinement of discriminating managements and public requirements, matters of great public and private importance relating to policy and needs of the public still prevail and must be handled with courage, with earnestness and with ability, and nowhere else can such generous and complete assistance be obtained for the purpose of handling these matters intelligently as in this Association.

The printed proceedings of the National Electric Light Association Conventions which are supplied to each of our members, in addition to the monthly bulletin, are a fund of information, which should receive a thorough study by every member, and are worth far more than the annual dues. In addition to which your attention is directed to the recently published "Electrical Solicitors Hand-book," which is far ahead of any other similar publication heretofore printed and which was published by the National Electric Light Association at the expense of very great effort. The organization of so many companies throughout this entire country in one National Association with a complement of permanent and efficient officers and very complete records of every description forms in itself a bulwark of strength that must aid our worthy objects and receive recognition from any opposition that may be antagonistic to the interest of our industry. These are reasons enough why every electric lighting company should deem it necessary to belong to our Association.

Too much cannot be said, however, as to the wisdom of making our section one of large proportions to include all of the New England States rather than to have separate state sections. Such multiplicity of organization would only complicate the objects of the National and without favorable results either, to the state members themselves. Our territory is so compact and so near alike throughout its area that the experiences and practices of members in any locality apply pretty well throughout the territory, more so perhaps than would be the case in hardly any other part of the country. I believe state organizations formed for the purpose of local protection to be beneficial but they must necessarily be local in character and their province should be to deal with state affairs, while our New England Section, made strong by the amalgamation of all individually, throughout New England, can be of vastly more assistance in the education of the whole.

Respectfully submitted,

S. FRED. SMITH, President.

MR. CAMPBELL (New London, Conn.) I move that the Secretary appoint a committee of three to report on the President's address at the meeting tomorrow morning.

(The motion was seconded.)

THE PRESIDENT. Gentlemen, you have heard the motion made by Mr. Campbell, that the President's address be left to a committee of three to be appointed by the Secretary to make their report at the meeting tomorrow morning. Are there any remarks on the question?

(The motion was adopted.)

Mr. Hodskinson (Secretary-Treasurer.) Mr. President, the Secretary will announce that committee a little later.

THE PRESIDENT. As our Association has no particular home in which to hold our conventions we must go from one state to another. It has been very appropriate to come to New Hampshire for our first meeting, and there is no better place, I might say, to come to, in New Hampshire, than Portsmouth. There were many reasons why we came here. We have with us today a gentleman who is thoroughly familiar with Portsmouth, and who will make a few interesting remarks at this time. It gives me great pleasure, therefore, to introduce to you Mayor Adams of Portsmouth, N. H.

MAYOR ADAMS.

Mr. President and Gentlemen of the New England Section of the National Electric Light Association:—I presume you were withheld just outside of Portsmouth's jurisdiction for a little while that your credentials might be thoroughly inspected and you might get the official word of welcome to Portsmouth; but this enthusiastic reception which you have given me tempts me to withhold that word just a second, while I give you the greetings which the Hibernian gave to his friends when he said, "I hope you will all live long enough to eat the chickens that scratch over the top of your graves." (Laughter.)

It is said that it is characteristic of Americans to make speeches, and I think somebody has said that when an American is born and full upon his feet his first utterance usually is "Fellow Citizens," and as he is about ready to exchange worlds he turns back and says, "Just one word more." (Laughter.) But there are times when silence is preferable to speech-making, perhaps, as in the case of the woman who consulted her physician, and he said, "Madam, you don't need any medicine at all, you simply need rest." But she said, "Oh, doctor, I wish you to look at my tongue." "Madam," he said, "that needs rest also." (Laughter.)

I am not to detain you long, but I want to tell you that I am glad to bring the greetings of all our citizens to this large and representative gathering, and to give you a cordial welcome to Portsmouth. Surely you have honored us in selecting Portsmouth for your first assembling, and you may rest assured that the freedom of the city is already yours and that every other official courtesy at my command will be gladly extended in your behalf during your stay here. Surely you have selected one of the best months for your assembling, and we think that you have come to one of the best cities in New England. (Applause.) Surely Portsmouth is a convention city because of its history, its accessibility and its opportunities and everything that is good and grand. I hope that you will all have a good time. You will have the keys of all the lockers, and if any of you get into trouble just come to me and I will do all that I can for you. (Great laughter and applause.)

The President. I think the members must feel easier after what his Honor has said. He has promised to leave with me the key to the City, so that we can feel perfectly at home.

The next matter on the program is a few announcements that I will make.

In order that the full attendance at this convention may be recorded it is asked that every member and guest will please register at the registration office at the end of this session, or as soon as possible thereafter.

With a great deal of pleasure I am able to announce that the presence of President Frueauff of the National Electric Light Association is expected tomorrow, and I hope that every member here will make it convenient to stay throughout our convention sessions. President Frueauff is expected to say a few words, and I am sure that you will all be interested to hear what he has to say.

This afternoon we expect to have here a photographer. This being our first convention I hope everyone present will try to be included in the picture, for it is desirable to get just as many in this first convention picture as possible.

This afternoon at 2 o'clock the members and gentlemen guests will embark on the steamer "Alice Howard" which will leave the landing in front of the hotel for a sail up the Piscataqua River. The Rockingham County Light & Power Company of Portsmouth have generously invited us to look over their power plant and will entertain the members and guests. Returning, the steamer will leave the company's plant at 5 o'clock, taking as long a sail as time will allow and reaching the hotel dock about 6 o'clock. The ladies of the party are expected to join the members at the company's plant for the return sail.

At the same hour the ladies will leave the Hotel Wentworth in barges for Portsmouth, and there, by the courtesy of the Portsmouth Board of Trade, guides will be provided who will take them to the many historic points about the city, after which tea will be served at the Hotel Rockingham. At 5 o'clock the ladies will meet the members at the dock of the Rockingham County Light and Power Company, and with them will return to the hotel by steamer, arriving about 6 o'clock.

The regular dinner this evening will be dispensed with, and a banquet will be held, to take the place of the dinner, the presence of the ladies being especially counted upon. This banquet is entirely informal, so that everyone may come without hesitation. There will be no extra charge for banquet tickets to the members or guests and the ladies of the party who have registered at the hotel. Tickets for the banquet may be obtained from the Entertainment Committee, and if you have not already received your tickets in your mail boxes please obtain them at the close of this session from the Treasurer in the registration office.

I think those are all of the announcements, except that our Secretary is now ready to announce the committee to whom the President's address is to be referred.

Mr. Hodskinson. (Secretary-Treasurer.) Mr. President and Gentlemen, I will announce the following committee to act upon the President's address:—

Mr. Alex. J. Campbell of New London, Conn.; Mr. E. A. Barrows of the Narragansett Electric Lighting Company, Providence, R. I.; Mr. Walter L. Mulligan of the United Electric Light Company of Springfield, Mass.

Mr. Campbell, the first named gentleman, to act as chairman of that committee.

The President. Next on the program will be the reading of the papers to be followed by discussion of the subject. I would like to announce that late last evening I received a telephone message from the author of the first paper, Mr. Charles R. Bishop, stating that it would be impossible for him to reach here in time to read his paper first, and I have asked that the second paper, on "Liability Insurance and How it Affects the Employee, by Walter L. Mulligan," shall take its place. I have the pleasure, therefore, of introducing to you Mr. Walter L. Mulligan of Springfield, Mass. (Applause.)

"LIABILITY INSURANCE AND HOW IT AFFECTS THE EMPLOYEE."

Walter L. Mulligan.

The United Electric Light Company has, for a number of years, carried both Public and Employees Liability Insurance and at the request of your Committee on Papers I have gathered a few of the facts regarding our experience and put them together for your benefit. Our company has never believed in the policy of letting the insurance company handle the cases alone, however, and we understand that this point is the one which has aroused the curiosity of some of the members of this Association.

We have on our payroll about one hundred and fifty men who are covered by the policy, as we insure all but the office help. When a man enters our service it is understood that he is to obey orders, and if, in so doing, he is injured in any way, we are to take care of him and put him in as near his normal condition as possible without loss of pay, provided he does not bring suit.

This fact being clearly understood, we never have any grumbling when a man is asked to do an unpleasant or dangerous task. We try to be careful in the selection of our help, however, and if a man shows any signs of carelessness we try to drop him before he damages our property or himself, but in spite of all our care we occasionally have accidents and our method of handling a case is as outlined below.

If a man is hurt so badly that hospital treatment is needed, we let the man select the hospital he prefers, if he is able to do so, and we give orders to see that the man has the best of everything. The man being left for the time being, we investigate the accident and give a complete report to the insurance company.

We will assume for the first illustration that the man was not careless but through no fault of his own met with an accident which resulted in serious injury with the liability clearly up to our company. One case of this character is fresh in our minds and we feel sure that our method of disposing of it could not be criticised by the employee in any way. This man was an inspector of street lights and in the making of his inspection he came across a lamp which failed to burn, and in trying to lower the lamp to see if it could be started, he got into a combination which could not be detected in the dark and received a shock from an 8000 volt direct current circuit through the right hand and out the left leg.

I had a photograph taken of this, as it is one of the worst cases, I think that ever came to our attention, and I will be glad to explain it to any of the members that are interested when I get through.

His hand was terribly burned, clear to the bone, and the foot badly scorched and it was several weeks before he was discharged from the hospital. During his stay in the hospital he was, of course, visited by the usual number of well meaning friends and a lawyer or two who advised him to sue the company if he wanted to get a fair settlement. This man, however, knew that our word was as good as our bond, and said he was satisfied to leave it with us to get a square deal. He also knew, as every employee knows, that if he did bring suit he would have to deal with the insurance company instead of us. As a result of the man's determination to keep out of court, he had all his hospital and doctor's bills paid and received his wages every week so that his family did not suffer. As soon as he was able to work we gave him a position in another department at the same wages he had before, and he is now one of our best supporters among the other employees and the general public.

We believe this fair method of dealing with the case is appreciated by any intelligent employee.

Now the point naturally arises as to where the insurance company comes in.

In this case, as in all others, we did not attempt to get a release until the man was as near well as he could be and then we began to talk business. When we found out what the total expense had been we sat down with the insurance representative and looked the proposition over, and after some deliberation the insurance company paid the whole bill, about $700.00, and secured the man's release. Now, this fair treatment made the insurance company solid with us, made us solid with the man and everybody was happy.

Another illustration of how it works in a different way, was a case where a lineman fell from a ladder and broke his leg. It was found upon investigation that this accident was caused by carelessness on the part of the injured man, and while we were honor bound to pay his expenses, we did not feel like adding anything for "mental anguish" and nervous shock. In this instance the man did not seem to appreciate fair treatment and as soon as he could get around he engaged a lawyer and proceeded to sue. As a result he got about $100.00, which did not begin to cover his expenses and we presume his lawyer got half of that. Furthermore, the man lost his position and fared much worse than he would have if he had been sensible and let us do what we thought was fair for him.

Still another illustration was the case where one of our station operators got mixed up with the brushes on an arc machine and received a broken arm and many bruises for his carelessness. After he had been treated in the usual way and was ready to settle, we divided the expenses with the insurance company and discharged the man from our service.

Some people have contended that we should leave the injured party alone when an accident occurs, and let the insurance company deal with the case directly and that is the method we do pursue in cases covered by our Public Liability policy, but in dealing with our help, who, in most cases, are of a pretty intelligent class, we do not feel that it pays. Our reason for this is the fact that the insurance company has no personal interest in the employee and in some cases may have an adjuster who is anxious to make a good bargain for his company and antagonizes the employee to such an extent that even if a settlement is made the employee would never lose an opportunity to knock the electric lighting company. We prefer to pay a little more than the insurance people may think is necessary, and have the employee feel that he got all he was entitled to.

In every case we have found that the satisfied employee did us much more good than we could have secured by spending the money for advertising. We believe that a satisfied lot of employees is a great help in keeping a satisfied lot of customers.

In connection with that I will say that we have not spent a cent in newspaper advertising for the past three years. As every employee is now an advertisement to our credit.

We, of course, have quite a number of small cases during the year, where a man may be laid up for a few days on account of some minor accident, and in all such instances we never ask the insurance company to pay anything unless the employee tries to make trouble, and that rarely happens. We assume the doctor's bill and pay for the man's time and if this does not satisfy him we have the insurance company behind us ready to protect our interest if we need it.

By handling the matter in this way, we save the insurance company some money, and when they are called upon to settle a case for us they are inclined to be more liberal than they would be if we ran to them for every little thing. In dealing with public accidents, however, we have found that the insurance company can handle the matter much better than we can, and we generally keep in the background unless called upon to assist.

During the past year we have had two accidents covered by the Public Liability policy, and in both instances the insurance people were able to effect a settlement without any publicity and without going to court.

On the whole, we are firm believers in insurance of all kinds, and carry team, automobile, property and fire insurance, as well as that above described.

The total amount paid out last year for insurance was about $2,500.00, and about $1,700.00 was for the liability policies.

THE PRESIDENT. Certainly the paper given by Mr. Mulligan has been very interesting to us all. One of the most important subjects that confronts every electric lighting company is as to the best methods of taking care of its employees, wherever an accident takes place. We have never had any disagreeable experience in my own company, (Salem, Mass.), but it is something that will bear a great deal of investigation and discussion and I hope it will be freely discussed at this meeting. I do not find that Mr. Bishop, the author of the next paper on the program, has yet arrived, so we will continue with the discussion of Mr. Mulligan's paper, hoping that Mr. Bishop will arrive in season to present his paper himself, for he is prepared to answer any questions probably far better than the same could be done by any one else.

I should like at this time to hear from any one who will begin a discussion of this able paper of Mr. Mulligan's.

Mr. Barrows (Providence, R. I.) I should like to ask Mr. Mulligan what the policy of his company has been in the case of a permanent injury or disability of some employee, whether any system of pensions has been instituted or what the company has done in a case of that kind.

Mr. Mulligan (Springfield, Mass.) We have one case of that kind now. The man is not totally disabled, however; he is able to do some kind of work. We have given that man a position and put him on the payroll, and will keep him on the payroll as long as he lives, whether he can work or not. (Applause.)

Mr. Sands (Malden, Mass.) Mr. President, I would like to ask Mr. Mulligan what his policy is in the case of an accident where from the nature of the accident it is impossible to determine at once whether there is any liability or not. Do you continue to pay that man's wages, or do you stop them until you have determined?

Mr. Mulligan (Springfield, Mass.) The way we generally do on that, as I say, is this: If the man has to go to a hospital or if he has to go home, we see that he is taken wherever it is necessary to take him. Then we immediately investigate the accident. It is understood, further, between ourselves and the insurance company, that the man shall remain on the payroll, and that his expenses shall be paid by either ourselves or the insurance company. Then we fight it out between ourselves when we get around to finding out really who is liable. In that way we have been able in all cases so far to come to a satisfactory agreement with the insurance people. I don't know that we have ever had any case where we could not come to some satisfactory understanding. We don't care particularly whether the liability is on us or not, as far as the care of the man goes; we agree with the men that they shall be taken care of. If it is their carelessness, of course, the probability is that we shall have to settle all the expense unless the insurance company is very generous; but the men know that if they are hurt we are going to take care of them, regardless of whether it is our fault or their own.

Mr. Sands (Malden, Mass.) You mean by "taking care of them" paying their expenses and keeping their wages going all the time?

Mr. Mulligan (Springfield, Mass.) Yes, we do.

Mr. Sands (Malden, Mass.) Have you ever found a case, Mr. Mulligan, where such action has prejudiced your case with the insurance company?

Mr. Mulligan (Springfield, Mass.) I don't think it has at all.

Mr. Sands (Malden, Mass.) Now let me ask you one other question, please. You spoke about minor accidents and not bothering the insurance company with them, but going ahead. Do you report those accidents to the insurance company?

Mr. Mulligan (Springfield, Mass.) Oh, yes. We, of course, hand in a report to the insurance company if it is nothing but a cut finger. But you can generally size a man up; if he is a man who is going to make trouble you will know it pretty quick. We have had within the last two months one case where a man was using a stepladder that he knew was a little bit weak, and he fell off and strained his back. That cost us something like $50, but that man we took care of and kept on the payroll, and I think since he was hurt he has worked enough Sundays and overtime to more than make up for it, and we have felt that that was a good investment. We had another case where one of our underground men was in a manhole and he got a flash from one of the underground connections. We treated him just the same way. That man, if you want to get him out at 4 o'clock tomorrow morning, will be there right on the spot. (Applause.)

Mr. Sands (Malden, Mass.) Referring to what Mr. Mulligan says in his paper about bringing suit, I have an experience in mind that I thought might be interesting. The case was this: We had a contract with a coal firm to discharge our coal. Under their contract they were to maintain and keep the hoisting apparatus in condition. The scaffolding broke. This man came down on to the deck of the barge and was very badly injured; it is a wonder he was not killed. The first question that arose was as to whom the liability was up to, whether the insurance company in which the coal firm was insured, or the company in which we were insured. That was a question for the two insurance companies to settle. In the meantime the man was sent to the hospital, and everything was done to make him comfortable. But inside of two weeks a Cheap John lawyer got hold of him and brought a suit, and the bringing of that suit prevented our being able to get any settlement with that man for two years. The insurance company said: "They have brought suit, now we will fight it out." If that man had not brought suit, inside of six months we could have gotten a settlement which I think would have been fully as satisfactory as the one we got at the end of two years, and saved the man his attorneys' fees.

We got a settlement of something like $4,000, and I think the attorneys got something like $1,400 or $1,500 out of it.

Mr. Mulligan (Springfield, Mass.) I might say in that connection we had the very same thing before we had this agreement with the men, and since we have had this agreement we have not had a case where it has gone that far.

Mr. Vahey (Boston Edison.) I should like to ask Mr. Mulligan whether in the securing of the release, the company gives any agreement to the employee, verbal or written, to secure him in his position in the future, or to continue medical treatment, or pay whatever expenses that may accrue from the accident. Does the company give him an agreement of any kind.

Mr. Mulligan (Springfield, Mass.) Well, that depends somewhat on the man. Some men will want to have you put it in black and white, and some won't. I think in nine cases out of ten we never have to give any written agreement. The men know that our word is good, and they are generally satisfied to leave it to us. We do have an occasional case where some fellow wants to get all the milk there is in the cocoanut, and at the right opportunity that man generally looks for a job somewhere else; we don't wish to have that kind of a man around.

Mr. Bates (Cohasset, Mass.) I would like to ask Mr. Mulligan if there is any written agreement between his company and its employees. Do I understand from your remarks, Mr. Mulligan, that it is just a verbal agreement? When a man comes into your employ do you just have a verbal agreement with him or make some written agreement?

Mr. Mulligan (Springfield, Mass.) It is just a verbal agreement. They understand that, whatever their rate of pay is, this protection goes along with it.

Mr. Davidson (Montpelier, Vt.) I would like to say that I don't understand why Mr. Mulligan's premium is so small for the number of men employed. I understood him to say $1,700 for about 150 men.

Mr. Mulligan (Springfield, Mass.) It is because we handle the cases in this way. The insurance company tell us—I don't know whether it is true or not—that we have a preferred rate. The policy that we are operating under now is made out for three years, and they tell us we have a better rate because we handle cases in that way.

Mr. Barrows (Providence, R. I.) I would like to ask Mr. Mulligan if he is at liberty to say what the rate is he pays.

Mr. Mulligan (Springfield, Mass.) If I remember correctly, it is in the vicinity of $1.25 per $100, based on the payroll. In connection with that, though, it was understood that we should take out a policy covering both the employees and the public.

Mr. Davidson (Montpelier, Vt.) What brought that question to my mind was this: We have very liberal policies in regard to accidents, both of the public and of employees, and the insurance company leave the settlement pretty generally to us; but the premium on our liability insurance is a little over $2,000 a year and we only have about 35 men.

Mr. Rollins (Hartford, Conn.) As I remember it, our premium was something like 2 per cent.—$2 on $100. In 1905 we cancelled our liability policy, owing to the fact that the insurance company were not as liberal with our employees as we wished to be ourselves, they held us up very closely in our dealings with our men, and as a whole their policy was unsatisfactory. We cancelled all policies and for four years we have insured ourselves, and we are well ahead of the game and treat our employees in a manner that meets our wishes, which is along the lines of Mr. Mulligan's practice.

Mr. Sands (Malden, Mass.) Mr. President, I would like to ask Mr. Rollins if he cancelled both the employees' and the public liability.

Mr. Rollins (Hartford, Conn.) Both, yes.

Mr. Campbell (New London, Conn.) Mr. President, I would like to say that we did the same thing the first of January. It seems to me this is a very important subject and is receiving consideration either directly or in related subjects all over the country. As you know, the federal government has taken some action on employees' liability as applied to interstate carriers. I think the attitude that is forced on the employing companies by the insurance companies is entirely wrong. The moment a man is hurt is the very time that your relations with him should become closer, but if you carry insurance you are obliged to be on the other side of the fence and put yourself in opposition to him, which I think is wrong. Looking at the matter in the broad way, and not in connection with our business alone, it seems to me that every line of business should pay its own cost, included in which, of course, is protection to the men performing the work. Then when the consumer buys the product a part of the price of that product should be the payment for any injuries and damages to the working men and the maintenance of their families. The first of January we figured the matter out, and we found that in ten or eleven years we had paid the insurance company about $11,000 over and above any possible expenses that they had incurred on account of our liability insurance. We put a sum, I think it was $2,000, away in cash in separate account to meet liability insurance, and each month we add to that about what we would pay the liability insurance companies. Like Mr. Davidson, we paid about $2,000 a year, and we are putting money into the bank at that rate to meet the expense of any accidents that may occur. I believe that the attitude taken in this country, as a whole, on this subject is wrong. As our industries increase the care of the working man and of his family must be something of increasing importance, and whether we pay the insurance company, or into a fund which is to take care of our employees or contribute to the town funds for the care of the poor and for hospitals, in some form or other, the expense must be borne, and I think it is a good deal better to pay the money directly to the injured man and his family, than to pay it to the insurance company and in part to lawyers, or to contribute to hospitals and poorhouses for the support of the man and his family after he is no longer able to take care of himself. I think the attitude Mr. Mulligan has taken is a very liberal one, and something, as he said, that will help his company as well as his employees. I was interested in noting that he has not taken the risk of the public insurance himself, and I am not at all sure yet whether we are wise in having done so. The insurance companies tell us that we are not. We have not yet had experience ourselves long enough to know whether we are wise or not.

Mr. Knowlton (Boston.) Mr. President, I would like to ask Mr. Mulligan how this liability insurance works out when applied to construction work in comparison with the regular operation. It is not quite clear in my mind where he draws the line between who should pay for accidents occasioned by trouble in construction and who should pay for accidents occurring in regular operation. All those he cited were apparently in the routine conduct of the business. Now, Mr. Mulligan, do you leave the liability entirely to the contractor?

Mr. Mulligan (Springfield, Mass.) Oh, yes. Yes. I think one thing that affects our premium, too, is the fact that we have about 80 per cent. of the wires in Springfield underground. That has always been done by contract, and the contractors had to assume the liability.

Mr. Knowlton (Boston.) How would it be in the case of day labor?

Mr. Mulligan (Springfield, Mass.) For example, all our service work, underground service work and work of that description, we do with ordinary day labor, and the men are included in the payroll and the company get the premium out of them.

Mr. Gibbs (Boston Edison.) Mr. President; as an advertising man, engaged in shaping the public mind and moulding its attitude toward public corporations, three points in connection with this discussion appeal to me very strongly. The first is the relation of the employee to the company. It seems to me that if the plan Mr. Mulligan has in practice is, in principle, at least, followed out by the companies here represented we are getting on a basis of high-grade selection in employing men. It means that the men who are employed by our companies, from now on, at least, and presumably that has been the plan in the past, must be of the very best quality for the class of work that they are called upon to do. Eliminating for a moment the personal equation, they are going to take exactly the same place in our companies that the dynamos do, that the engines do, that any piece of apparatus does. They must be selected for their special fitness; they are going to be A1 men for those jobs, and they are going to be worked at their best capacity, their highest efficiency, and provision must be made for their wearing out and breaking down. If such provision were not made it would be unjust to ask them to do some of the work we do, and Mr. Mulligan's accident policy system follows that line. Those men, of course, must be taken care of when they grow old and wear out, just as much as a new generator must be put in the place of one that is worn out.

A very valuable feature in connection with such an attitude towards the employee is the loyalty. We had an accident in our Head Place station about two years ago. In the evening, when they were getting things in shape again, we had a representative there from each newspaper in Boston. There was not a newspaper man there who did not marvel at the loyalty of the employees in going into that place that had been pretty well burned out during the day and not knowing, so far as the newspaper men could see, where the live wires were, and where possibly death confronted them; going in there without hesitation and doing the work that they were asked to do. When men feel that they are thoroughly protected by their company, you have a magnificent tone of loyalty that means more than anything that can be measured in dollars and cents.

The third point is the value of this sort of treatment of the employee from a publicity point of view. We have a motto that the Boston Edison Company uses a good deal in its advertising and in other ways, that "a pleased customer makes ten." Every employee is urged to pay particular attention to the interests of the company, whether he is engaged in active business-getting work or not. You won't find a man in our company who is not interested in getting a new customer, in selling him a piece of apparatus, or in doing something to push the business in some way, and if he is not selling something he is shouting for the company. Every man has got a little coterie of friends upon whom he exerts an influence. He can talk to those people, and he shapes their point of view. They may not any of them admit it, but he does it just the same. Now, if every employee is doing that, he is spreading a friendly attitude toward the company, and the very fact that it is known among working men that a company treats its men in such a considerate way—well, you could talk for a week about its advantages. It cannot be measured. It is of inestimable value to every company to be in such direct personal touch with the people.

Mr. Clough (Boston Edison.) Mr. Campbell has stated some figures. You stated $11,000 you paid the liability company, Mr. Campbell?

Mr. Campbell (New London, Conn.) Over and above any possible expense they have incurred.

Mr. Clough (Boston Edison.) I think one point in regard to a company's assuming this liability is the question of expense. How many employees would that cover?

Mr. Campbell (New London, Conn.) About 35 or 40; somewhere around there.

Mr. Clough (Boston Edison.) Probably a large company will think a good deal before assuming that responsibility.

Mr. Campbell (New London, Conn.) Answering the gentleman, I do not see why a large company should differ from a small one. If you have a greater number of employees you do a greater volume of business. We put the money which we should otherwise pay to the insurance company into a separate fund, and it is included in our operating expenses today. In the course of a few years if we do not have bad luck we expect to have such a fund accumulated that we can reduce the payments to that fund. If we have bad luck we may have to increase them.

Mr. Clough (Boston Edison.) I was trying to find out if what you laid aside you thought would cover any possibilities that might come up in the future by the way of liabilities in case of accident. Some accidents entail a good deal of expense; and I wished to know whether you thought the sum you are laying aside would cover all the expenses in all cases. Probably you have not put that to practical test, you have not had time.

Mr. Campbell (New London, Conn.) In answer to that I can only say that based on ten years' experience we are putting aside more than enough. In that ten years there have been two deaths, and in our figures we have included these settlements, and the $11,000 was net over and above all the expenses to the insurance company. Based on those ten years we are putting aside more than enough; but we might have a run of bad luck, and there would not be enough. In that case we should have to draw on the outside funds of the company. There is a certain element of risk in it, or certainly there is a risk until we accumulate a very large fund, but we feel that it is well worth while to take the risk, not only because we think we will gain financially in the end, but more particularly because it puts us in a position to have different relations with our employees, which I feel is the important point. I think a man should feel that if injured he will at least receive his wages and hospital treatment, whether he is liable or not, and the payment should not be made to hang on a technical thread. I think that is the great point in the whole matter. And also that he should receive what money he receives when he needs it, and when his family needs it. There is little use in paying his family something, five years after he is dead and buried, and giving half of what they do get to lawyers. The whole method of handling that matter in this country I am convinced is entirely wrong, but I think slow progress is being made towards handling it in a better way.

Mr. Vahey (Boston Edison.) I should like to ask Mr. Mulligan another question. In case of the death of an efficient employee, resulting from no fault of his own, the liability being clearly up to the company, does the company then withdraw and leave the insurance people to fight it out with the employee's heirs, or does the company do anything for the family of that man?

Mr. Mulligan (Springfield, Mass.) I believe we have only had one case of that kind, and that was four or five years ago, before we adopted this scheme. At that time I think the insurance company paid the man's family quite a sum. In that case, though, the liability was on us. I believe now, however, if we had a case where a man was killed and it was through no fault of his own, that we should make some preparation to take care of that man's family.

Mr. Vahey (Boston Edison.) I should like to say, in answer to the answer of my question, that as far as I can see, Mr. Mulligan's company acts in a very humane way in every possible contingency.

Mr. Jarvis (New England Telephone & Telegraph Company.) Mr. President, I would like to say on the question of the advisability of larger companies attempting liability insurance, that the New England Telephone & Telegraph Company carries its own insurance for both the public and its employees. This plan, so far as I know, has proved satisfactory. We are trying to cultivate that feeling towards employees, recommended by the previous speakers. It is not always possible to do what we would like to for the employee after an accident, but whenever he, his friends or advisors permit, everything possible is done to make him comfortable and hasten his recovery and the result is much more satisfactory to everyone than when he is left to his own resources. We have been paying considerable attention lately to improvement in construction to prevent accident. The telephone lines, are, of course, mixed up with electric light lines and many of the accidents occur from contact with electric light wires. My investigation has led me to believe that some of these accidents can be avoided by rearranging the construction, particularly with reference to the location of primary electric light circuits on poles used jointly and where electric light and telephone poles occupy the same side of the highway. The Telephone Company will be glad to co-operate whenever such work involves a rearrangement of its own construction.

Mr. Mulligan (Springfield, Mass.) One thing in connection with the state of affairs in our company I may have overlooked. We don't have an agreement which covers sickness. If a man is sick that is no fault of ours; it may be the man's fault. So within the last year we have organized an employees' benefit association, and that takes care of men if they are sick, they get a reasonable amount per week, so that their doctor's bills are paid. During the last month we have leased some rooms which we are going to turn over to this association and follow the plan of some of the larger companies, have talks every month and let the men use the rooms as a general club room, with newspapers and magazines on hand. So that with this association to back up the care that we give the man when he is hurt we think we will take care of most any emergency.

Mr. Wilson (Berlin, N. H.) Mr. President, I will say that our proposition is largely industrial, the electric lighting portion of it being comparatively small. We employ about 2,000 men. We have an employees' protective association. The method of conducting it is that the men sign an agreement allowing a certain amount to be taken from their pay each fourth payday, that is, monthly. From that fund there is no expense, except a normal charge for one of the office men who does the clerical work. If a man is disabled he is paid 50 per cent. of his wages from that fund. At the end of the year a dividend is declared, and what has not been paid out in benefits reverts to the employees. Thus the insurance is at cost. This we find works very successfully. We have a considerable number of accidents, but the last year the average insurance was less than $2 per employee, being insured for half his wages. We carry also liability insurance, and personally I don't think much of it. I agree with Mr. Campbell very thoroughly that the fact that an employee is injured doesn't make his employee a criminal. It is not a matter to be dealt with in the courts at all. It should be simply a part of the expenses. In some European countries, notably Germany, and I think in England now, they take it out of the courts entirely, and in case a man is permanently injured he has to be paid one-half of his regular wages by the employer, and in cases of death a fixed sum. It is not taken into court; it is simply a matter of law that they shall be paid, so that it is a part of the expense of manufacturing as I think it should be.

We try to keep very close with the employees, and they understand that in case they are injured they are taken care of, that is, they are used right. We have numerous cases where men have been injured and we have carried them along for years, giving them positions where they could earn a livelihood, and in cases where a man has left a family, why, we have looked out for the family. We don't have any black and white agreement, but that is the general understanding. Personally I have advocated eliminating the liability insurance for anything excepting public liability. As far as the employees go, I think that the men who are in direct contact with employees can settle with them more fairly than any liability insurance company could possibly do. (Applause.)

Mr. Clough (Boston Edison.) This question of the company assuming the liabilities of employees in case of accident has been taken up pretty thoroughly by the Boston Edison Company, and Mr. Gibbs has made three points of the subject at issue. I think there is one strong point I might add, making a fourth, the practicability from the company's standpoint of assuming this liability. The telephone gentleman has made a statement in regard to an association which exists in his company. It seems to me that if there are any others present who know of associations of this sort and can furnish any figures, it would be of extreme advantage to this meeting to quote any figures they have in mind, because the responsibility of carrying on a liability of this sort is something which other companies might be extremely interested in, in order to start such a venture themselves. The insurance company bases its rate of insurance on its experience, but a corporation or an electric light company has no figures upon which they can start and assume that responsibility.

Mr Chase (Concord, N. H.) I should like to ask Mr. Wilson of Berlin if membership in his employees' association is compulsory?

Mr. Wilson (Berlin, N. H.) It is not.

The President. The importance of this paper has demonstrated itself by the very generous and general discussion that has taken place, but as our time is fast going we shall have to close the discussion on this paper and take up the next one. Before doing that, however, I think it might be interesting to know how generally this liability insurance is adopted by the various companies which you gentlemen represent, and it might be well to ask two or three questions. I would like to know how many companies do not carry any liability insurance. If you will please raise your hands! We won't use your names, but it will give an idea of how this matter stands, perhaps, throughout our membership. (Six hands were raised.) How many companies carry only public liability insurance? (No hands were raised.) How many companies carry insurance only on their employees, leaving out the public? I will vote with those. (Two hands were raised.) And by those that do not insure, how are accident charges taken care of; that is, do you wait until the accident happens, or do you make an annual charge for insurance to take care of the possibility of accident? Is there anyone here that can give us information on that point?

Mr. Rollins (Hartford, Conn.) We set aside a sum to take care of the accidents that occur. We have done that for four years. We save a certain amount of money; I can't quote the figures exactly.

The President. I should like to say that in the corporation that I represent (Salem, Mass.) we have not insured the public for several years, and while I am unable to give you any figures, I feel quite sure it has been very satisfactory to us to assume that liability ourselves. We do carry at the present time, and have for many years carried, insurance on our employees, but I think upon looking into that subject it may be a question whether we shall continue to insure much longer or not, because our lines are in very good condition and we believe it is far better to put our lines into the best shape and prevent these accidents than it is to have the accidents and to have to pay out the money for insurance or other damage as well as loss or injury of our employees.

As the time has arrived when we ought to reach the next paper, which treats of "Advantages of Steam Heating for Electric Light Companies, by Mr. Charles R. Bishop," I want to say that when our committee met for the purpose of making up this program we believed that this subject was an exceedingly interesting one to learn about. It would seem in New England, where we have cold and long winters and where we have to make use of heat so many months in the year, that if there is anything in the commercial sale of steam heat the electric lighting companies ought to get busy and see if that part of our business can not be developed. I am sure that we shall get much information from the paper that is to be read, and it gives me great pleasure, gentlemen, to introduce to you Mr. Charles R. Bishop of Lockport, New York. (Applause.)

Mr. Charles R. Bishop. I did not mean to disturb your meeting by coming in late, but after having driven from Buffalo to Boston, in my car, through two days of rain, arriving there yesterday afternoon and proceeding here via rail this morning. I took a vehicle marked "*Rapid*" from the depot to come up here, but owing to a break-down had to walk half way. (Laughter.)

I am very much pleased to have been asked to present a paper, particularly in view of the fact that I am not a member of your Association. I should very much like to be, but not residing in New England, do not believe that I am eligible.

"THE ADVANTAGES TO ELECTRIC COMPANIES OF CENTRAL STATION STEAM HEATING."

CHARLES R. BISHOP.

The subject of central station heating is one, I presume, which has come in some form or other, to the attention of every manager of an electric plant in New England, yet possibly there are but few members of this branch of the National Electric Light Association who have any comprehensive idea of the great advancement of the enterprise during recent years, or know of the large number of companies that have undertaken the supply of steam for commercial heating purposes, and still fewer who know from actual experience what can be accomplished in this field. That such a condition exists in New England seems at first thought strange, in view of the fact that other forms of public utility service have been developed to the highest degree in this section. It is due, possibly, to the extensive development of gas, water, electric lighting and street railway enterprises which have required such constant and unremitting attention from the management, that sufficient time could not be spared for a thoughtful consideration of central station heating.

While New England has been justly recognized as standing foremost in the development of public utility enterprises it has also, in a measure, enjoyed the distinction of being almost ultra-conservative, and has, no doubt, been waiting for the full development of district steam heating before seriously taking up this field of service.

During the past thirty years the number of cities supplied with central station heating has increased rapidly, year by year; large quantities of data, both reliable and useful, have been compiled; methods of construction have been standardized; correct conditions of operation fully ascertained; proper construction and insulating materials necessary to secure low maintenance cost and small transmission loss have been developed; equitable methods of charges for service rendered have been introduced through the development of accurate meters in which the public place confidence,—therefore, it would seem that the time was at hand for the public service companies in New England to exploit this field as thoroughly and as successfully as they have the others.

Before taking up the present state of district steam heating, it may be well to touch a little upon the history of the enterprise.

At the time of its conception, in the year 1876, there was no practical knowledge of anything pertaining either to construction or operation, maintenance of underground lines, the quantity of heat required in various classes of buildings, cost of generating and delivering steam, or any data upon which to base the charges for services rendered. A number of years passed before sufficient data had been collected to determine what had been the causes of excessive transmission losses, large repair bills, and generating costs so high that profitable and satisfactory operation was difficult. Notwithstanding the fact that the early results had been unsatisfactory, it appeared to those most directly interested that there remained enough of an encouraging nature to justify further effort. Experiments were continued upon a much larger scale and many different kinds of insulating materials were thoroughly tested, together with several methods of providing for expansion and contraction—each class of experiment requiring considerable periods of time to determine real value. In this way the enterprise progressed along lines of improvement in construction and insulation, but with little attention being paid to economy in generating steam, to methods of selling, or to general management.

In 1880, and during the early period of development a system of steam mains was installed in Lynn, consisting of long lines of pipe of small diameter, designed to carry relatively high pressures, very imperfectly insulated and with practically no protection against the effects of water which more or less surrounded the mains. The construction of the plant was carried through without appreciation of engineering requirements, no provision made for relieving the mains of condensation except through entrainment; boiler house economies were not considered, and the management was entrusted to men without experience and wholly incapable. The result is obvious.

About the same time, a plant which was installed in Springfield, Mass., under practically the same methods of construction as were used at Lynn, but with better management, succeeded in supplying service for over twenty years. Shortly afterward, a very extensive system of hot water distribution was installed in Boston, but was doomed to failure in a short period of time. As there was but little detailed information published regarding the hot water plant at Boston, the impression became quite general that the plant had been a steam heating system, which was incorrect.

Other failures of steam heating plants occurred, however, in various parts of the country, but totaled less than a dozen, with causes of failure due to the same sources in all instances, namely:—poor construction and insulation of the underground system, management left to inexperienced men, a lack of proper means and methods of charging for steam consumed, and a deficiency in data of all kinds. Contrast the few failures with the great number of successes which total more than two hundred cities, a small proportion indeed, and a much less percentage of failure than has occurred in electric lighting or in street railway service, particularly the horse and cable lines.

In the New England states there are one hundred and seventy-two cities having a population of over five thousand, and still in but three of them is there a district heating system of any magnitude, while Pennsylvania, having eighty-two cities of over five thousand inhabitants, can claim central station heating plants in at least sixty-nine cities. Illinois has fifty-one cities of five thousand population and over, out of which thirty have more or less extensive systems of heat distribution, and in addition, there are heating plants in eight cities in Illinois of less than five thousand population.

The question that now suggests itself is: Why are so few New England cities supplied with the service? Is it on account of climate conditions? No, because steam heating is a success as far south as Birmingham, Ala., where snow is almost unheard of and the mean winter temperature is higher than the mean temperature of October, alone, in New England. Is it on account of the heating season not being of sufficient length? Certainly not. Is it on account of a lesser difference between the cost of fuel to the central station company and to the consumer? No, statistics are proof of that. Is it on account of local commissions? It cannot be said that that is the reason,—in fact, there is not a reason, but on the contrary every reason is decidedly in favor of district steam heating in New England, as compared with any other section of the country.

The heating season here is regarded as of more than average length and severity. The cities are more compactly built, particularly the residence portions. The cost of fuel for central station use as compared with that purchased by the individual user is in favor of district heating. The class of business available is better and the prosperity of the community is acknowledged to be greater than in other sections.

As the subject of methods of construction of steam distribution plants is one now recognized to have become standardized, and descriptions have been given from time to time in the various publications to which most of the membership of this Association are subscribers, or for those who may not have read such articles as can be procured from manufacturers and contractors, it would be of greater interest at this time to touch upon that phase of the enterprise designated as "Results of Operation" under which there are two principal sub-divisions, namely,—those comprising the operation of plants which supply no public utility service other than steam for heating and known as "live steam plants," and those which supply steam for heating but utilize the exhaust steam resulting from the operation of their electric plants and are universally referred to as "exhaust steam plants."

Since this Association is composed of representatives of electric light and power companies, let us devote ourselves to a consideration of the "Commercial Possibilities of Operating an Exhaust Steam Heating Plant in Connection with the Operation of Present Stations," a topic suggested by a member of your Executive Committee.

First. Is there a market and demand for a central station supply of steam for heating purposes? I think you will all agree that there is, and no doubt many of you have been approached by owners of business blocks or residences to furnish a supply of heat, and others have been disappointed that their solicitors of contracts for lighting and power have not succeeded in procuring a considerable amount of additional business which would readily have been secured had you been able to supply steam for heating as well as electricity for light and power.

Is there as good a market for steam heat as there is for electric light and power? I believe there is a better market,—in a sense electric light can be regarded as a luxury, so also can a public distribution of water, of gas, or of street railway service. To no one of us is a public service of any of the above mentioned commodities necessary. In this locality we can live without artificial light, if we arise with the sun and work until it sets, we would labor more hours than the average man now works; we need not have our residences or places of business supplied by a water company, since we can live without such service, taking our supplies from waterways, wells or cisterns; in place of riding on street cars we could live down town, walk, ride a bicycle, or drive a horse. Heat is recognized as an absolute necessity for the maintenance of human life, it cannot be secured in this latitude from nature's sources during winter, it cannot be successfully stored for long periods of time, it must in some manner be manufactured for immediate consumption, and, therefore, to a greater degree is demanded of public service companies than are the other named commodities.

Can your company supply heat at a cost comparable with that at which an individual himself can produce it? It is a fact that many of you are manufacturing heat in the form of steam, but what becomes of it? Simply converting it into mechanical energy in the form of electricity from eight to fourteen per cent. and throwing the balance away, either into the atmosphere or into condensers? The plant operating non-condensing may have eight per cent. heat efficiency, and the condensing plant a possible fourteen per cent. conversion. Why not sell this large amount of otherwise lost energy for a price which will pay the original total fuel cost, including also such other expenses as water, oil, waste and labor in boiler and engine rooms? Can it be done? Yes. Others are not only doing that very thing but are also earning interest and depreciation on the cost of the steam distribution system. In this connection, let me cite the results of a few companies.

K. W. H.	Coal Lbs.	Water all Purposes Lbs.	Coal Cost	Water Cost	Oil and Waste	Boiler Room Labor	Engine Room Labor	Total	Steam Receipts	Net Rate
1,902,970	16,383,649	145,302,510	$21,091.82	$692.77	$596.36	$2,473.37	$2,008.88	$26,863.90	$37,190.35	40c Ave.

Steam investment outside of station, including street mains,
services, trenching, repaving, street traps and meters, $122,070.16
Space heated—approximately 10,000,000 cu. ft.
October 1st, 1908—May 25th, 1909.
Combination plant operated 3 seasons. City of 17,500 population.

K. W. H.	Coal Lbs.	Water all Purposes Lbs.	Coal Cost	Water Cost	Oil and Waste	Boiler Room Labor	Engine Room Labor	Total	Steam Receipts	Net Rate
541,767	6,768,661	48,131,094	$7,974.55	$463.20		$1,029.00		$9,466.75	$12,497.85	40c Ave.

Steam investment—approximately $48,500.00
October 1st, 1907—May 1st, 1908.
Combination plant operated 5 seasons. City of 10,000 population.

K. W. H.	Coal Lbs.	Water all Purposes Lbs.	Coal Cost	Water Cost	Oil and Waste	Boiler Room Labor	Engine Room Labor	Total	Steam Receipts	Net Rate
1,087,233	12,316,000	75,556,071	$22,333.55						$29,020.94	50c Ave.

Electric receipts for same period $41,112.42
Steam investment approximately $45,000.00
Eight heating months of 1908. Space heated.
Combination plant operated 8 years. City of 10,000 population.

K. W. H.	Coal Lbs.	Water all Purposes Lbs.	Coal Cost	Water Cost	Oil and Waste	Boiler Room Labor	Engine Room Labor	Total	Steam Receipts	Net Rate
2,496,508	24,837,136	177,053,950	$15,523.91	$1,072.30	$370.48	$4,432.97	$2,378.86	$23,777.90	$25,931.68	27c Ave.

Steam investment—approximately $103,000.00
October 1st, 1908—June 1st, 1909.
Note:—Steam rate should be at least 60 per cent. higher.
Space heated about 16,000,000 cu. ft. City of 43,000 population.

Another interesting manner of studying the foregoing results would be to add to actual generating costs, interest and depreciation on the investment for steam mains, which is not properly an item of generating cost, but is included in order to get any cost whatever per K. W.

Plant No. 1

BOILER AND ENGINE ROOM COSTS.

8191 Tons Bituminous Coal at $2.57 1-2 per Ton,	$21,091.82	
Wages, firemen and helpers,	2,473.37	
Wages, engineers,	2,006.88	
Water,	692.77	
Miscellaneous Supplies,	596.36	
		$26,863.90
Add to the above 10 per cent. for interest, depreciation, etc., on steam investment,		12,207.01
		39,070.91
Receipts from sale of steam,		37,190.45
		1,879.76
Totalised switchboard cost per K. W., including interest and depreciation on steam investment, $1,879.76 divided by 1,902,970=		.000987c

Plant No. 2

3334 Tons 661 lbs. Coal, costing,	$7,974.55	
Boiler Room Wages for 7 months,	1,029.00	
Engine " " (Not given) assumed for 7 months,	980.00	
Water,	463.20	
Oil and Waste,	100.00	
		$10,546.75
Interest and Depreciation at 10 per cent. on steam investment, approximately $47,650.00,		4,765.00
		$15,311.75
Heating Receipts,		12,497.85
Totalised switchboard cost per K. W.		2,813.90
$2,813.90 divided by 541,767=		.00519c

NOTE:—As their heat customers are heating for only about two-thirds of the previous cost to them when generating with their own apparatus, this company's rate should be 50 per cent. higher with a corresponding increase in revenue.

Plant No. 4

12,418 Tons, 1186 lbs. Coal, Costing,	$15,523.91	
Wages in boiler room and hauling coal and ashes,	4,432.97	
Wages in engine room, inc. oilers,	2,378.86	
Water,	1,072.30	
Oil and Waste,	370.48	
		$23,777.91
Add to above 10 per cent. for interest and depreciation on investment of $103,000.00 in steam mains, etc.,		10,300.00
		34,077.91
Heating Receipts,		25,931.08
		8,146.93
Totalized switchboard cost per K. W., including interest and depreciation on steam investment, $8,146.93 divided by 2,498,508=		.00326c

NOTE:—These results being obtained while selling steam for practically fifty per cent. of what should be charged and compete with cost of fuel to individual users in that city.

Let us now consider the results secured by companies operating plants which supply no public utility other than steam heat.

SEASON 1908-09

Fuel Lbs.	Water Consumption all purposes, Lbs.	Total Operating Cost Fuel, Water, B. H. Labor, including Salaries, Repairs, Taxes, Etc.	Income from Sale of Steam at 40c. per 1000 lbs.
32,644,166	261,216,438	$34,598.72	$57,004.68

This company pays regularly a 6 per cent. annual dividend, and has created in addition a surplus of approximately $60,000.00, which surplus is equal to 50 per cent. of Capital Stock (No bonds issued).

Cubic feet of space heated 22,811,900.

Fuel Lbs.	Water Consumption. Lbs.	Cost Coal Hauling, Removing, Ashes, Etc.	Cost Firing, Water, Boiler House Labor, Salaries, Taxes, and Sundries.	Income from Sale of Steam.
40,337,248	302,917,521	$27,529.51	$19,346.50	$72,071.10

Net earnings for the past season approximately 15 per cent., which is about the average result of this plant.

Cubic feet of space heated 15,959,907.

Plant investment including real estate $176,618.67.

Capital Stock issued $177,000. (No bonds.)

This company pays 6 per cent. dividends annually and has an undivided and uninvested surplus account of $30,865.84, after having charged off 3 per cent. annually for depreciation.

All repairs and renewals are charged into operating account.

You will note by a comparison of these two live steam plants, that the latter company manufactured over 57 per cent. more steam per cubic feet of space heated than the first named company, and this difference is almost wholly accountable by the fact that one company charges for steam furnished upon the basis of consumption as shown by meter records, while the other company operates entirely under the flat rate method. Applying the revenue per 1,000 cubic feet of space of the latter company to the space heated by the former, the gross revenue of the first named, would then be approximately $103,110.00, or nearly 81 per cent. greater than the present income.

Recently, the President of that Company was asked why they did not charge at least 60c. rate, which would not increase the cost of heating beyond a point where the consumers could save money by operating their own plants, and his answer was: "Should we make such an increase in rates, either a new heating company would immediately be formed, and with a more modern and efficient plant compel us to reconstruct under today's standardized and improved methods of construction and insulation in order to compete with them, or force us out of business. As a second condition, our consumers would probably appeal to State authorities for an examination of our affairs to ascertain if such increase in rates was due to a lack of sufficient profit under present rates, and such an examination would show that in all probability we are earning a greater profit than the companies in this city now profitably operating such plants as electric light, street railway, gas or water."

I have chosen the two plants referred to, because they are operated in cities of approximately the same size, in the same State, under the same climatic conditions, and occupy the same class of territory.

I think you will all agree that the results given prove that exhaust steam heating can be profitable in any city, and plants furnishing no service other than steam heat, are also profitable.

Influencing the degree of success of district steam heating plants there are several conditions, viz.:—

First: The climatic conditions should be such as to insure a good market for the sale of steam.

Second: The generating station should be reasonably adjacent to the districts which it is proposed to serve, simply in order to reduce the investment necessary to reach the business.

Third: The local conditions under which steam is sold for heating should be such as will permit fixing a rate, which, while well within economic limits from the standpoint of the consumer, can still be sufficiently high to pay a satisfactory profit on the investment over and above the cost of manufacturing steam, including depreciation and amortization.

Fourth: Efficient management.

Fifth: The meter system of charging. (Measured service.)

Sixth: The total amount of business secured to the total amount procurable.

Seventh: but by no means the least:—The installation of the plant under standardized methods of construction which have proven efficient through years of actual operating experience, and by reason of which the transmission losses are reduced to a minimum, and depreciation low.

An eighth condition should be included for "live steam plants" operated purely as such, viz.:—A suitable and economical boiler plant and equipment.

In any city where a central heating plant is constructed, a sufficient territory must be reached by the underground system to insure a volume of business in which the profit existing between generating cost and selling price does not exceed fixed burdens. Where the heat is supplied by exhaust steam a sufficient volume of business should be secured to at least utilize, during minimum demand heating the full amount of exhaust steam from any single engine unit. Station piping should be so arranged that any engine can be operated, condensing, non-condensing or under back pressure while furnishing steam for heating, without reference to the manner of operating any other engine in the station. This can be accomplished without much additional cost for piping, but is very often neglected, resulting in back pressure being carried on a portion of the engine plant without compensating advantages. To secure maximum results the demand for steam for heating should be slightly in excess of the maximum amount of exhaust steam available at all times.

Considerable care should be taken in the design of a proposed underground system of steam mains, and in order to properly determine its cost, gross and net earning power, the average and peak demands, and the probable effects upon present operating conditions, the method of procedure is generally as follows:—

A careful examination is made of all the territory, both business and residence, within a distance of from one to one and three-quarter miles from the generating station, depending upon local conditions. Manifestly unfavorable districts are then eliminated; a scaled map is made of the balance of the territory upon which is shown the location and cubic feet of space of each of the buildings contained therein. Upon this map there should also be noted the type of building construction (wood, brick or stone); classification indicated (retail or wholesale business, manufacturing, public building, hotel, boarding house, apartment house, theatre, residence, etc.) Information is also secured from local records, or from the nearest source, covering the maximum, minimum and mean monthly outdoor temperatures, average monthly wind velocity, and average monthly relative humidity. Then with this information collected and using compiled data covering average and peak monthly heat demands in the various classes of buildings to which service has been rendered in other cities having similar climatic conditions, the average, peak and total steam demands in each block can be determined and noted on the map. In this manner the steam demand is calculated for each block from the extreme point of delivery back to the station, resulting in a fairly accurate estimate of quantity of steam that will be required for the heating season, each month and at peak demands. The size of mains from the station and in the various blocks is determined by using tables of carrying capacities of modernly constructed and properly insulated underground steam mains, operated under a maximum initial pressure of five pounds above atmosphere, and transmission drops of one-quarter pound per 1,000 lineal feet of main. As much or as little of the ultimate complete system may then be installed as is deemed desirable for the first year's construction, and these mains will be of proper size to meet the inevitable growth of the plant, without eventually resulting in serious overloading with its attendant excessive back-pressure or impaired service.

When available monthly station records of coal and water consumed in the manufacture of electricity are plotted graphically, the monthly demand for steam is likewise plotted, hourly and monthly electrical output considered, and thus the extra amount of fuel and water required is found. With the known cost of fuel, water, etc., it becomes a simple matter to calculate what will be the increased operating expense. The curve of steam demand at the generating plant is made up of consumers' demand, transmission losses, and unaccounted for steam.

The next step is to establish a rate at which the steam is to be sold, and this depends strictly upon local conditions. As a general rule the average rate per thousand pounds of steam sold is approximately ten per cent. of the cost to an individual user of a ton of anthracite coal, if that is the kind of fuel generally used. As an example, where anthracite coal is sold to the consumer at $7.00 per ton, the central station company should receive an average of 70c. per 1,000 pounds of steam, which rate would be slightly in favor of the consumer on a basis of actual B. T. U. efficiency. Cumulative sliding scale rates are usually adopted in order that automatically the larger consumer should pay a lower average price per 1,000 pounds of steam than the smaller consumer, the justness and reason of which is apparent.

The investment is made up of cost of power plant connections, street distributing mains, service mains, trenching and paving, consumers and street meters and street traps. With these costs known, together with the cost of generating and operating, amount of transmission loss (which is a fixed quantity dependent upon the number of square feet of surface of underground mains), and probable income from the different buildings, the profit which will accrue when serving 25 per cent., 40 per cent., 50 per cent., 75 per cent., or 90 per cent. of total available business in the whole territory or any portion of it, may be estimated within a reasonable degree of accuracy.

It is not necessary nor would it usually be advisable to cover the full amount of territory in the first year's installation, but a sufficient amount should be covered to insure profitable operation.

Another very important factor must also be considered, namely,—the additional amount of electrical business that can be secured through your ability to furnish, not only electric light and power, but heat, with the additional profit resulting from such increased electrical sales. A feature of possible great importance is the fact that with an extensive heating plant operated in connection with electric light and power, you are practically insured against a competing plant being installed even though the threatened competition may be of hydro-electric nature. I make this statement understandingly. Illustrative of this feature, I will cite the following instance.

In a certain city there existed a company furnishing all the gas and electricity used, with the exception of the street railway load. It had a station equipped with boilers, engines and generators to be used in emergency times,—it had its own hydro-electric plant but of somewhat limited capacity, and it also had a contract with a nearby hydro-electric company covering a long term of years, which agreed to furnish any amount of current up to a maximum of 30,000 horse-power at a price close to ½c. per K. W. H., monthly bills being based upon the average of the highest, daily, one minute peaks occurring during the month, but with no "firm horse-power" restrictions. The company sold current at rates which averaged less than a cent per K. W. H.

In the same city there was a company operating an extensive system of district steam heating, which company installed a thoroughly modern steam electric generating plant, consisting of well designed single cylinder four valve engines, alternating current generators, etc. Within six months they secured a majority of the commercial lighting business, practically all of the residence electric lighting load and a fair amount of the smaller and higher-priced power business. This was accomplished without any cutting of rates but due in a large measure to better and more uniform service, which is always true of a steam driven electric plant as compared with a hydro-electric plant with its usual long and extensive high voltage distribution lines. Details of subsequent events are extremely interesting, but to mention would increase the length of this paper beyond the allotted time, so I will only give the outcome.

The competing companies were consolidated into a third company with the company first in the electrical field in control of the stock of the consolidated company. An interesting fact now appears. In view of the favorable contract held by the company for the purchase of all the current ever likely to be needed, and with electric demand far in excess of the ability of the steam generating plant ever to serve and not exhaust to the atmosphere, what method of operation would be adopted? Would the plant be kept for stand-by purposes, shut down as an electric plant, or continued in operation? Without changing any of the conditions the consolidated company continued for six months the operation of the steam electric plant to determine, for themselves, the manufacturing costs under the combination of generating current and selling exhaust steam. The results were such that they then bought and installed additional steam engines and generators which more than doubled the former capacity, and have since, during heating seasons operated the generators not only to their full capacity but with heavy overloads during peak demand hours. Even throughout the night hours, electricity is manufactured, although current could be supplied from the outside hydro-electric company at no cost to the local or purchasing company,—due to the already mentioned fact that the company purchases current on the one minute peak basis, and the peak had already occurred, thereby fixing the bill for the 24 hours' service, this condition existing on account of the desire to increase the amount of exhaust steam.

More complete details and additional records of results in other cities can be given to companies desiring same.

It may be of interest to learn how transmission losses may be determined. At low points in the system of underground steam mains, at intervals of from 500 to 1,000 feet, depending upon local conditions, street traps are placed in manholes and the condensation discharged through meters. Service connections are always taken from the extreme top of the steam mains so that practically all of the condensation of steam occurring in the distributing system reaches the traps and is measured by the street meters. This loss in modern systems does not exceed the transformer core losses of most electric plants. It may be stated that the percentage of transmission losses and unaccounted for steam is considerably less than the percentage of transmission, transformer and unaccounted for losses of electrical distribution.

While it must be recognized that the construction cost of a steam distributing system greatly exceeds the construction cost of an electrical distribution system, still it is a well known fact that the average consumer pays many times more for heat than he does for light. The number of hours of steam service is fully 80 per cent. greater than the total number of lighting hours of the year, and steam heating has the added advantage of being continuous during the 24 hours of each day throughout the heating season.

The rates for steam service supplied by an electric company should be based on the assumption that all steam sold will be manufactured expressly for heating service, and then there would be no question of there being a profit for all steam furnished in excess of the exhaust steam utilized. Upon this basis, no company need have any fear of contracting for additional heating business, being limited, only, by the capacity of the generating plant.

In conclusion, let me call special attention to a few important facts brought out in the foregoing:—

Experimental period has passed—present development equal to that of other public utilities.

Underground construction standardized.

Meters developed to a higher degree of accuracy.

Live steam heating is profitable.

Exhaust steam heating is more profitable.

Supplying heat from your present electric stations will—

Increase—value of present investment.

Increase—number boiler horse-power hours and its attendant increased boiler efficiency.

Increase—number engine and generator horse-power hours resulting in increased electrical efficiency.

Increase—wonderfully the number of heat units actually utilized of the total number manufactured.

Increase—load and power factors.

Increase—K. W. output.

Increase—income from electric sales.

Increase—income from plant operation.

Improve—position of company to keep out a competing company.

Improve—position of company to keep out isolated plants.

Increase—NET PROFITS.

Increase—DIVIDENDS.

The President. I cannot imagine a more important paper than that which we have just heard read by Mr. Bishop, and no doubt the discussion will be as interesting. At a recent meeting of the Massachusetts Electric Lighting Association, Professor Thompson called to the attention of the members the necessity of conserving our natural resources, and I don't know of any better way to save our resources than by saving the coal that is used. When we consider the waste that is allowed in every electric light and power station operating twenty-four hours a day for the entire year, and see what can be saved or what can be made use of, the income may more than offset, perhaps many times, this waste, and take care of any lower efficiency in the operation of the station. I hope there will be a very thorough and general discussion of this subject, because there is very much to be learned. Will Mr. Lisle start the discussion?

Mr. Lisle. (Providence, R. I.) Mr. President, I am not prepared to discuss this matter because we have had no steam heating experience. I will say that we have been looking into it and it was a matter which I thought would be interesting to this Association. Possibly, Mr. Bishop can take up the question as to the possibilities more in detail, the line of argument being that in most of the successful heating companies which we have heard about it has been possible, and the people who have done it have told us that if they could not pay their entire switchboard cost they would not consider it worth continuing and that in many cases the companies who have gone into it in a modern, up to date way have more than paid their switchboard cost of current, which seems like a fairy tale.

Mr. Mulligan (Springfield, Mass.) Mr. President, I would say that in Springfield we tried to feel around a little bit on this subject, and I would like to ask Mr. Bishop if any of the companies he has quoted are located in cities where there is permanent paving, such as wood blocks and concrete.

Mr. Bishop. In every one of them, Mr. Mulligan, yes, with the possible exception of one.

Mr. Mulligan (Springfield, Mass.) In our case we found that there was going to be a strong opposition to digging up the streets for anything of that kind.

Mr. Bishop. I should think that might possibly be true in Springfield, for the reason that in Springfield formerly existed the plant referred to in my paper, and in which there were many valves, but none of which were surrounded by manholes permitting access to them, thus when a valve had to be turned on or off, or repacked, it was necessary to get a permit from the board of public works in Springfield to dig up the asphalt pavement in order to get down to turn a valve off or to repack same. That is hardly modern construction, and was indeed an unusual condition, and I would not be surprised if there was a feeling in Springfield, on the part of the city authorities against, perhaps, a possible repetition,—present day methods and results being unknown to the citizens of Springfield. I can mention the names of a large number of companies that have been in the steam heating business for ten years or more, that have had repair accounts of less than $100, for the entire time.

As I was leaving my office last Friday evening my stenographer gave me a letter which had just been delivered, and which I should like to read,—It is from a Company operating in a small town.

"I have not received an answer to my letter of August 20th." (He wrote us on August 20th, stating that he had been asked by several companies why it was possible to heat more space with exhaust steam than with live steam, and on the date of his last letter he had not received my letter of explanation.)

> "I have prepared a simple statement of the results obtained by our little plant, and will use it at the meeting of the Pennsylvania Branch of the N. E. L. A., September 8-10, 1909. Our steam investment is $27,308.01, including all service connections. Our gross income (steam) exceeds $8,000. The maintenance charges in the past eight years of our operation were $232.29. This includes scraping ten meters, the purchase of a new reducing valve for the power plant, and all labor cleaning traps. The gross income is $2,500 more than our total fuel bill for the entire year. We have not lost a single customer in eight years. Our back pressure averages from two to three pounds. We have hired no extra help. We could not spare a man if the steam plant was discontinued. I do not want this information to come to our town, but we are willing to give it to the central station men if they use it right."

The Company has a plant of about 500 horse-power and a connected load (electrical), of about 100 acres and 5,500 incandescent 16 candle-power lamps. The population of the town is about 4,000. As they have but recently begun to place their steam consumers upon the meter basis of charging and still have about half of them on the flat rate basis, I consider a steam revenue for eight months of $2,500 in excess of their twelve months total fuel bill for light, heat and power as flattering indeed. There is no question at all now as to such a combination being exceedingly profitable.

To answer Mr. Mulligan's question direct, almost every City is more or less paved. The Company with whom I am connected is working in Indianapolis at the present time and encountering great difficulties. The work is being installed in a gravel trench which is very deep in Illinois street. At the corner of Illinois and Washington streets, there are perhaps twenty or more different sets of conduit lines, including the various pipe lines. At that one corner the trench is from eight to ten feet deep, and requires four sets of cross bars to hold the shoring, all of which makes difficult steam main construction. The pavements in Indianapolis are all asphalt. Cheap natural gas, I believe, is also used there for heating purposes.

The Pennsylvania branch of this same association at their meeting being held at Eagles Mere today, is devoting a large part of its time to the consideration of central station heating, a committee having been appointed to secure information and edit a paper, securing data from the sixty-nine operating companies in Pennsylvania.

I shall be glad to answer any questions. Make them just as direct as you wish to. I have been on both sides of the question. I have been President of the operating company, as well as interested in the contracting side, and I will be pleased to give you my experience.

Mr. Rowell. I should like to ask Mr. Bishop what effect this has on the station equipment during the heating months. That comes, of course, at the time of the year when we are making the greatest demand on our station facilities. Running through the summer (condensing) and then running high pressure in the winter will certainly cut down our capacity in our stations at a time when there is the greatest demand on it.

Mr. Bishop. That is quite true. If your plant is already electrically overloaded at peak demand times, to an extent that it would not stand any more overloading, of course, it would be necessary to add another engine unit. It would not, under any circumstances, be the proper thing to do to add boilers for the sole purpose of supplying the steam direct, but you might have, during electrical peak demand periods, to put in an additional boiler due to non-condensing and make some changes in points of cut-off in your engines. It would not be difficult to figure out just what changes in the power plant would be necessary. In some condensing plants it might be necessary to increase the boiler horse-power, from 25 per cent. to 30 per cent., due to decreased engine efficiency when running without condensers, but such conditions are rare. There are very few stations which are so badly overloaded that they could not be operated as combination electric and steam plants, although there may be some. We often advise in designing a plant, if condensing water is cheap and easily available, that the plant be operated condensing during non-heating months, either using condensing engines or by putting in exhaust turbines in connection with non-condensing engines to a sufficient extent to meet the electrical demand during the summer months; and during the winter months the engines, all or a portion, being operated either condensing or non-condensing, according to the demand for steam for heating. The station operation feature is not a hard one. It may seem intricate at first thought, but is all arranged to operate quite automatically. Any extra amount of steam needed for heating is taken automatically from the boilers through a pipe by-passing the engines and it is cut off by means of the same ingenious regulating and reducing valve. The engineers do not have to turn valves on or off on account of the steam demand.

Mr. Carey (Providence.) I should like to ask Mr. Bishop if the operating companies in the steam heating plants make any provision for damages in case of suspension of the service to the customers.

Mr. Bishop. They only guarantee the supply of steam at from one to two pounds pressure at the service valve in the consumer's building and contracts are subject to the ordinary break down conditions that any electric light company puts in its contract for lighting or for power service,—no other.

Mr. Lisle (Providence, R. I.) I would like to ask if Mr. Bishop can give us an idea of what the average cost of first equipment per head or per thousand of population is, and what is a fair income per head of population from the business.

Mr. Bishop. On a per capita basis it is extremely hard to figure, because you would cover the same territory in heating as you would electrically. There are usually large districts in every city so sparsely built up that it would not be practicable to attempt to reach them with steam mains, however, using Lockport, as an illustration, the steam rate now is about 41 cents per thousand pounds of steam, and the per capita is about $2.30, I should say, but only a small portion of the city is covered by steam mains in comparison with the portion reached by gas mains or electric lines. In the territory reached, the steam revenue per capita is much greater than the gas or electric revenue. The company there operates the gas plant, furnishes the street arc lights, the commercial arc lights and all the electric service of the town, including the power service, and the current receipts are slightly under 8 cents per kilowatt hour, taking the total kilowatt hour output, including city contracts, the gas rate is $1.00. As I have stated, the steam rate is about 41 cents. At these rates I believe the per capita combination receipts are over $10.00. The steam investment in underground mains is perhaps $100,000 in that city. The investments in steam mains may be anywhere from $10,000 in the smaller towns, up to a half million dollars or more, depending upon the sizes of mains and extent of territory covered.

Mr. Vahey (Boston Edison.) Mr. Chairman, all I wish to say is, that if 10 per cent. of what Mr. Bishop says is true, in behalf of the Amalgamated Union of Family Coal Heavers and Furnace Shakers, I am willing to dig the ditch when it comes my way. (Laughter and applause.)

The President. I should like to ask Mr. Bishop one question if it has not already been asked of him. How far distant from the central station is it economical to carry the underground system of heating?

Mr. Bishop. That also depends upon the load. We have installed a little over two miles in a direct line. Approximately twenty-seven miles of street and service mains, I think, is the largest single underground system that I know of in operation. One of the large gas and electric syndicate companies, perhaps you all may know of them in one way or another, as they have twenty odd gas, electric and steam plants, are buying live steam plants to a greater or less extent throughout the country, and combining with the electric plants that they purchase in the same cities. In one city they are now putting in engines built for back pressures of 40 pounds to exhaust the steam into very small lines, great distances. As a matter of fact we would not call it good practice today to do that, but in the instance mentioned the steam plant was originally installed to be operated under an initial pressure of from 40 to 50 pounds. It covers a very large territory and to reconstruct all the mains of sizes large enough so that steam could be circulated at pressure of from 2 to 5 pounds, would cost a great amount of money and the lessened operating expense would not equal the interest on additional investment.

The President. Is there anyone else present who would like to ask Mr. Bishop any further questions?

Mr. Rollins (Hartford, Conn.) I would like to ask Mr. Bishop if there is, to his knowledge, any modern steam turbine plant equipped for steam heating.

Mr. Bishop. Yes, one of the Detroit plants is a turbine plant, the St. Paul plant is a turbine plant, and then there are small plants like Adrian, Mich., and Springfield, Ohio, and a portion of the Peoria plant.

Mr. Rollins (Hartford, Conn.) That is, turbine is run non-condensing in the winter months?

Mr. Bishop. Yes, very often and other operating turbines in winter months and using the exhaust for heating, and a good many of them are in non-condensing plants,—one, Birmingham, Ala., in which there are two three-thousand-kilowatt turbines, and there are also several more or less large-sized Corliss engines, and they are not operating condensing at any time. They have no condensing facilities,—no water there to condense with.

Mr. Rollins (Hartford, Conn.) The plant of my company is located about a mile from the congested business district and equipped for condensing. To produce current at five mills per kilowatt hour for coal and labor we have to sharpen our pencil pretty sharply. If we could reduce that cost in any manner to zero and make the kilowatts a by-product, it would interest us very much.

Mr. Bishop. That is what ought to be done. I think that would interest you all; I guess it does. I should be willing to give the names of these cities that are quoted, and any others, to those that are interested; I would not want to do it publicly, because these reports are given, you know, with the understanding that the name of the town is not to be given, but they can all be substantiated, you can go there or write there. If any of these figures are incorrect I should like to be so informed. They have all been given us under the companies' names.

The President. Quite likely, Mr. Bishop will be very willing to have this paper printed in our proceedings, with such matter eliminated as will in any way interfere with the courtesies between his company and the base of his information.

Are there any more questions any member would like to ask?

Before a motion to adjourn is received, I would like to ask those members who have come in since the meeting opened to please register as soon after this meeting as they can.

Unless there are other matters to come before this meeting a motion to adjourn is in order.

(Adjourned till Friday, September 10, 1909, at 10 A. M.)

SECOND DAY.

FRIDAY, SEPTEMBER 10, 1909.

The Convention reassembled at 10.50 A. M., President Smith presiding.

THE PRESIDENT. Gentlemen, before we begin the program as laid out originally, I desire to say that we have been favored with the presence here of two of the officers of the National Electric Light Association. These gentlemen have had so much experience in conventions and with the business of carrying on the Association that I know you will all be glad to hear a few words from each of them. Therefore, before we begin taking up the program, we will hear a few words from President Frueauff of the National Electric Light Association. It gives me great pleasure to introduce to you President Frueauff. (Great applause.)

PRESIDENT FRUEAUFF OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION.

Mr. President and Members of the New England Section:—It is a pleasure for me to be here with you this morning and to take part in your gathering. I am sorry it was impossible for me to attend throughout the entire session, but during the past week I have had the pleasure of attending one other of the state conventions, that of the Pennsylvania sections at Eagles Mere and yesterday I had the pleasure of attending a meeting at the Schenectady works of the General Electric Company, where they are now organizing a company section. At that gathering, last evening, they had between 300 and 400 representatives of the General Electric Company and of central stations in that vicinity present. They had a very enthusiastic meeting, and I think it bears evidence of giving added impetus to the work of the National Association during this year.

I don't know that there is anything special I can say to this gathering, other than to assure you of my appreciation in being here and possibly to tell you something of the aims of the Association for the next year. As you know, each year various committees are appointed to carry on work preparatory to the convention that winds up each administration. The most of the committees that were appointed last year found that while they covered a great deal of ground in their work there was still much to be done, and they are to be continued and further work done in their particular branches. For example, the Committee on Overhead Line Construction still have found a great deal of work to do, and they will be continued, and we expect to have from them another valuable contribution to central station work. The Committee on Meters are planning to do a great deal of further research work and enlarge on the able report that they gave last year.

Some new committees are planned, for example, one on Terminology. That may sound like a formidable name to give to a committee, but after all, it is simply a committee that is going to aim to standardize many of the terms that are in frequent use in the electrical field, but that have come into either disuse or misuse inadvertently. To cite a sample instance is the term, we will say, flat rate. Many central stations refer to flat rate as the rate received per month or per year or per lamp for service, while others in referring to flat rate say, "We have a flat rate. It is 10 cents a kilowatt hour," or "It is eight cents a kilowatt hour." There are a great many technical terms that in the same way have come to have a slightly different meaning in different localities or among different people, and through this work of the Committee on Terminology, we hope to pretty well standardize the phraseology of our business.

The hand book that was gotten out and went to the members this summer is to be kept alive, and from time to time we hope to add further supplements or additions that will always contain live matter. One of the new sections that is to be put in this year will be one treating of the electric automobile and its advantages in central station work. Another that has been suggested, and that is about complete and ready to go into the new editions, will be something treating on gasolene competition. I am not particularly familiar with the conditions in the New England states, so I don't know how much annoyance or how much trouble you have had here, but in some parts of the country the smaller central stations have been seriously crippled by active gasolene competition, and the aim in this section is to give some facts and data bearing on that subject and in that way help our membership.

The proceedings of the June convention will be ready for distribution next month, and I think you are all going to be pleased to receive that— I was going to say volume, but it is really three volumes. There will be somewhere in the neighborhood of 2,500 pages, containing the papers that were presented at the Atlantic City convention and all of the discussions that went with them, and that in itself is a storehouse of knowledge that every central station operator and every supply man can well sit down and read with profit. I sometimes think that we go to the conventions or we receive these proceedings and we hear of things in them that we fully intend to put into actual practice when we get back to our work, but much of the good of attending either a National convention or this New England gathering is apt to be lost sight of unless we actually make a note of it and go and try it out in our individual case. One thing I would like to impress on the members is that the good that you take away from these meetings you put to practical account. It is all right to know a thing, but it is a good deal better to be able to apply it and to get the advantage of it. In getting together, what we have in mind is finding out what the other man knows and giving him in return some of our knowledge, but we fall short of our true duty unless we actually put our knowledge to some application.

One other thing that has interested the administration this year and I think it would be well to bring up here, although I don't think that the New England members are possibly as much disturbed by this as the members may be in some other parts of the country, is the passage of the recent tariff bill, carrying with it a tax on the net earnings of all corporations. Included in the deductions that shall be made by the corporations before reporting their amount as net earnings there is a provision for a reasonable deduction for depreciation. I will say there is nothing more or nothing less than that. The question that comes up to us now is this: Do we know in our own minds what is a reasonable amount to deduct for depreciation? Some of us answer that very readily, by saying, "Yes, we are making a certain deduction, it is a certain proportion of our gross earnings," or "It is a certain proportion of the valuation of our plant," or "It is a fixed amount that we deduct from time to time." Others say, "We are taking care of it by not expending all of our surplus earnings in dividend payments," and others say that "We are gathering data on it, but up to this time we have not determined in our own minds just what our depreciation rate should be." But now that this thing becomes a matter that we must report to the government it is something we ought to give special attention to, and I have recommended to our Public Policy Committee that they go into it pretty thoroughly.

I can see a condition that may grow out of that law that may be embarrassing. It provides that the reports showing the net earnings are to be filed with the Commissioner of Internal Revenue in each particular section, and if he approves them they are then forwarded to Washington. If he disagrees with the amounts, believing that the statement may be untrue, he has a right to put inspectors on the books of any corporation and verify the accuracy of the statement, and if it is not correct, there are penalties in the way of fines to be collected for misrepresentations. The thought occurs to me that if we don't have a pretty settled idea of what is a reasonable depreciation there may be a big variation between the deduction for depreciation made by one company and that made by another, and it would call attention to a rather mixed state of affairs. For instance, if one company should apparently deduct 5 per cent. of its gross and another only take off 2, and one inspector should examine those reports, he would rather wonder who was right and who was wrong, and it may bring up this matter of depreciation from an outside source rather than right from the central station interests, where it should properly come. I only give you that as a thought, something to think over that will become a factor this year. If you are deducting for depreciation are you satisfied that that deduction is ample? If you are not, you ought to have in mind what should be a reasonable allowance before reporting your net earnings for taxation purposes.

The Commercial Committee, who have been such an active feature in the recent conventions, are to be continued this year, and they have a number of plans to do some work throughout the year that will be called to the attention of the members through the Bulletin.

I want to call your attention again to that publication. That we aim to have as a constant reminder to our membership the fact that we have an organization banded together for the mutual good of all in the central station and manufacturing business, and if the readers will only take advantage of its columns, read those articles and make the most of the question box, both in giving questions to the editor and also in answering questions that you are in a position to answer, you will get the fullest use from that publication.

The Association conducts headquarters in the Engineering Building on 39th Street, New York City, and I would like to urge on the members when they come to New York City, whether it is to attend a convention or for any other purpose, that they drop in there and just see what the organization consists of. You are contributing to its support, you are the people who keep the Association alive, and it is only right and proper that you should know what is going on. And for the officers and for the staff at the headquarters, I am sure they would be only too glad to have any of the members come in and find out what is going on there, and relate their experiences, and get acquainted. We have there the nucleus of a library that was given the Association last year by Mr. Weaver. In that building there is another technical library that is available to our members. So I think you would be well repaid for a visit to the Association headquarters.

The Committee on Membership this year is making a very active effort to get in a great many more of the central stations. The plan that they have outlined seems feasible. We believe we are going to get in a great many of them. The meeting at Schenectady last night was rather an opening wedge. At that we had over 400 people in attendance, who came there to consider the practicability of forming a company section and of also taking in some central stations in that vicinity. We can get our greatest good, we can make our organization more live and powerful, as we increase our membership and influence throughout the country. Our

Membership Committee is scattered all over the United States, and while our membership comes from all parts of the United States there are still a good many of the central stations that we are inviting to come in this year. We feel that in banding together for the promotion of the electrical industry we are doing all who are now members great good, and we are in a position to do all who are not members a world of good. One very forcible example came up the other day. A company in the state of Oklahoma applied for membership, and at the meeting of the Executive Committee it was admitted. When I got back to my office I found a letter from the manager of that property, asking me where he could get hold of a lawyer who was familiar with insurance law. When I read it I wondered where I had seen that name before, and I 'phoned the headquarters and found that we had just admitted this company to membership. He had applied for membership in July. In his letter he went on to say that in February they had had a very bad fire in the town in which they were operating, and their company had been sued for $90,000 damages, due to defective wiring, or such was the claim of the party having the fire, and he had come into the National Electric Light Association on the dead run in order to get the benefit of the advice of our insurance experts. Now, there was a small central station, that did not think there was anything in the National organization for them, it did not pay them to put up $7.50 a year to belong, but the fact is that through the advice of our insurance expert they are getting what they could not get anywhere else for hundreds of dollars. So if there is no other reason for belonging to this Association the insurance element is one thing that we may well think about. But there are the ideas, the interchange of ideas that you get either in attending the meetings or in studying the proceedings or in reading the Bulletin, that are invaluable, if you will but apply them.

I want to thank you, gentlemen, for permitting me to meet here with you this morning, and I hope you will have a most profitable meeting, and I wish the New England Section all success. Thank you. (Applause.)

The President. President Frueauff has given us very much food for thought, and I am sure you will all benefit from what he has had to say. Speaking about the matter of depreciation, I can readily understand how the various companies may get into trouble if they don't get busy and take care of the matter. Of course, that depends a great deal on local conditions, that personally I have given that matter quite a little thought in years gone by. In our company we have no particular rate of charging off, but what seems to be a fair and reasonable amount is charged from each particular item semi-annually. I have an inventory that is corrected every six months, and such portion is taken off of the value of each piece of machinery or particular article as we think it bears to its true value. A great deal can be done for the benefit of the corporation in that direction. It takes some years to get an inventory entirely systematized, but nevertheless it pays in the end.

President Frueauff speaks of the organization of the National Association. The short time that I have held the position of President of this Section, it has given me some idea of the work that entails upon the officers in a new organization. We, of course, have not discovered all of the particular points that will naturally come up, but such work as has been done has taken considerable time and effort. The work of the National Association must take many, many times more time and work than we have been able to give to our Association. The needs of the National Association, up to this time, as far as the clerical work or Secretaryship is concerned, have been taken care of by a lady, who has worked hard and has accomplished a great many results. The formation of the state and geographic sections has added and will add very much more to the requirements of the position. It has been found necessary to make some change in the Secretaryship, and other work has been found for the former Secretary. At the last meeting of the Executive Committee, if I may be allowed to express myself in that way, a gentleman who is known to all of you, and who has up to the present time been the editor of the largest electrical journal in this country, Mr. T. Commerford Martin, was asked to become the Secretary, from October 1. Mr. Martin, as I understand, has not given out this information before, and I feel highly privileged in being able to notify you of that fact now. Mr. Martin has honored us this morning by his presence, and it gives me great pleasure to introduce to you, Mr. T. Commerford Martin, the to-be Secretary of the National Electric Light Association. (Applause.)

MR. T. COMMERFORD MARTIN,

Secretary of the National Electric Light Association.

Mr. Smith, in paying me this very handsome compliment and in introducing me for the first time to any audience in the new capacity which I shall shortly assume, has a little anticipated the change of occupation and work which I shall make very reluctantly, and therefore I stand before you this morning still the editor of the Electrical World, and would not like there to be any misconception as to my exact function or place. So that should you convey to me any information which might perhaps have with it characteristics pertaining to the art of journalism, I might like you to know that still my first duty would be to rush it into print and I should not regard it as a privileged communication. I am very glad indeed to know that in resigning the reins of duty and of office, I shall leave behind me a staff which has grown up on the old paper in the last few years, which is more than competent to take the work which I resign, a staff which is very admirably exemplified in the person of my esteemed collaborator, Mr. Knowlton, our New England editor.

I am very glad indeed to appear in my new capacity first before this excellent body, and I was so impressed with the importance and the significance of these geographical sections that when the opportunity was presented to me to come here, I felt that it was not only an opportunity, but an obligation and a duty. I was very glad indeed to be here to sustain the hands of my new chief, Mr. Frueauff, who in his incumbency exhibits that spirit of devotion, of zeal and of enthusiasm which has been so marked a characteristic of the presidents of the National Electric Light Association. The success of that body, now one of the most influential and distinguished of our great commercial organizations, is largely due to the spirit which has been infused into it by its successive presidents, and which is shown to you this morning by Mr. Frueauff, the present holder of the office. The section you represent has a pre-eminent place in the electric lighting art. Here some of the apparatus which we have used in the past, still use, has been created and perfected. Here some of the earliest traditions of the art were laid down. Here some of the greatest discoverers and engineers have accomplished their task. You, gentlemen, have entered into a high heritage, and as editor of the old paper it has been a great pleasure to me to see the zeal and intelligence and success with which you have developed the art in New England, and we still look to this section of the country for light and information and instruction as to how some of the problems shall be dealt with. As, for example, with regard to all these new public service commissions which are coming to the front, and the lines they are laying down here in New England, are far in advance of anything we have had in other parts of the country. You have dealt, for example, with the questions that arise under the indeterminate franchise, and we look to New England, for light and information as to how we shall deal with these questions when we get up against them in other sections of the country.

Mr. Frueauff has outlined a splendid program for the National Electric Light Association, in which you will share, and in which you will be partners, and it will be my duty, very largely, so to speak, as I understand the obligations which I shall assume, to act as manager of a great clearing house of information, so that what is done in one part of the country for the betterment of the art and for its protection will immediately be made known in every other part. What New England finds is best and judicious will be made known in Texas and on the Pacific slope. You gentlemen can co-operate very actively and helpfully with the Secretary in all this program of new work which is laid out.

While when I came here I did not expect to have the honor of being introduced to you as the new Secretary of the National Electric Light Association, having had that pleasure, let me now ask from you the most cordial and hearty and helpful support in promoting the welfare of the Association, which represents your interests and an Association to which I have been proud to contribute for the last twenty-five years in one way or another. (Great applause.)

The President. I think I am ready to promise to Mr. Martin the cordial support of every one of the members of the New England Section. Before starting in on our regular program I have one notice to give, that the Committee on President's Address is ready to report at this time. Will the Chairman please make his report?

Mr. Campbell (New London, Conn.) submitted the following report:—

REPORT OF THE COMMITTEE ON PRESIDENT'S ADDRESS.

Your Committee on the President's Address begs to report as follows:—

The President has so clearly described the history and objects of this section that we recommend that his address should be in the hands of and read by every member.

We very heartily endorse his recommendation that state associations, except for purely local objects, should be disbanded and all the energy and effort of the members be concentrated in strengthening the New England Section.

We believe his suggestion as to holding both summer and winter meetings is an excellent one.

We feel that the President's efforts to open membership in the New England Section at least to employees of municipal plants deserve the hearty approval of the members, and recommend that the section continue its efforts in this matter. We feel, in this also that the work and efforts of our President, together increase in the allotment of income from the National Association, were wise and proper, and we urge that he continue to agitate the matter. We believe the dues from member companies in particular should be made large enough to avoid the necessity of calling for additional subscriptions from time to time.

It seems to us that a monthly bulletin,—foreshadowed as a possibility by the President,—is not needed for the present at least, as the ground is well covered by the Bulletin of the National Association.

The whole report is so thorough and complete that we recommend its careful reading by all members.

Respectfully submitted,

Alex. J. Campbell,
Edwin A. Barrows,
W. L. Mulligan.

The President. You hear the report of your committee, gentlemen. What is your pleasure?

Mr. Whitaker (Portsmouth, N. H.) Mr. President, I move that this report be accepted and placed on file.

(The motion was seconded by Mr. Davidson of Montpelier, Vt., and adopted.)

The President. The next matter in order is the first paper assigned for this session. It is entitled The Low Voltage Tungsten Lamps, by Mr. Frederick Welles Prince. Is Mr. Prince ready to read his paper? (Applause.)

THE LOW VOLTAGE TUNGSTEN SYSTEM IN RESIDENTIAL LIGHTING.

Frederick Welles Prince.

On the introduction of the tungsten filament incandescent lamp, at first sight it seemed the goal of incandescent electric illumination. It was an efficient lamp for the Central Station to operate and an economical one for the customer to burn. From the manufacturing engineer's and the customer's standpoint, the lamp was perfectly satisfactory, giving roughly twice the candle power for one-fifth less current, and lasting 1,300 hours instead of 700. Where the old 50 watt metallized filament lamp gave 20 candle-power and burned 450 hours to 80 per cent. of its initial candle-power, the tungsten for 40 watts gave 35 candle-power and burned 1,300 hours to 90 per cent. of its initial candle-power.

However, from the Central Station Manager's standpoint of commercial utility, the tungsten lamp was not so pleasing. He had to re-adjust his ideas from a 2½ watt per candle metallized filament lamp to a 1¼ watt per candle tungsten lamp. How was he to handle the new lamp, on a meter or flat rate? Would he give it away or sell it? And the high cost of the lamp made renewals also a serious problem. Was he to allow the residential consumer with 300 candle-power installed in his house to cut his meter bills in half with no corresponding economy in the cost of maintaining the meter. The lamp was expensive to give away, and the ordinary handling through Central Station Supply Departments and the consumers' hands was difficult because it was so very fragile. Breakage losses became very large, and yet every Central Station Manager saw that here was a lamp that would enable him to compete with gas, if he could properly take advantage of its high efficiency, and yet in some way compensate for its high cost and extreme fragility.

With meters costing $4.50 per year to maintain, and as Mr. Insull, in the National Convention at Atlantic City, said, now doing only 40 per cent. of the work formerly done with the carbon lamp, and thus the liability of residential lighting bills being halved by the introduction of the tungsten lamp, the Central Station Manager was forced to some solution of the residential lighting problem, and the only satisfactory one seems to be the introduction of the Low Voltage Tungsten Lamp.

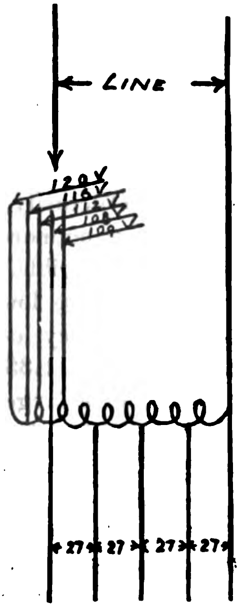
The imperfections inherent in the carbon lamp have made house lighting undesirable for electric light stations which are able to secure any other business, and consequently in the larger cities very few houses are furnished with electric light by any companies that can escape doing so. The carbon lamp has these unavoidable faults, after the first hundred hours rise it drops rapidly in candle-power, and after 400 hours it blackens so perceptibly as to greatly reduce its light, and no station has been able to remedy these difficulties. The average candle-power of a 16 candle-power carbon lamp, burning its natural life of 700 hours, is about 11 candle-power, so the consumer gets only 2-3 of what he is entitled to.

The tungsten low voltage lamp has a slow, gradual increase in candle-power, does not blacken so perceptibly and by a slight sacrifice in efficiency can be made to have a life of almost 2,000 hours. Thus the tungsten filament lamp overcomes the principal faults of the carbon lamp and in low voltages can be made in 10 and even lower candle-powers. One of the chief troubles with the metallized filament lamp was the inability of the manufacturing companies to make a satisfactory 10 candle-power lamp which is principally in demand in residential lighting.

Thus it can be fairly stated that the introduction of the low voltage tungsten makes residential house lighting a practical and profitable proposition.

The 30 volt or 60 volt tungsten allows of ordinary handling with almost no breakage where there was 19 per cent. loss, due to breakage in the 120 volt 40 watt tungsten. Also where no satisfactory 10 candle-power lamp was manufactured in the high voltage, an excellent 10 and even 4 candle-power is made in the low voltage. The price of the low voltage lamp is only 65 per cent. of the high voltage and it may be almost called a by-product, as its filament may be made from the short cuttings of the high voltage filaments. Where the 120 volt tungsten requires a special large bulb to accommodate its four filament loops, the low voltage filament is mounted in an ordinary 10 or 16 candle-power bulb. This makes it particularly convenient in displacing existing lamps in special residential fixtures, ornamental lighting, etc. Also the short filament of the low voltage lamp makes it practical to burn it successfully at any angle.

The low voltage system is adapted to present Central Station Supply system by the use of an Economy or Balance Coil with 112 volt primaries and four 28 volt secondary circuits. Extra taps are brought out on the primary side that admit of exact voltage adjustment on the secondary circuits.



Wiring diagram of Economy Coil with adjustable primary taps.

This type coil can be used equally well with 30 volt or 60 volt tungsten lamps. Referring to the diagram, secondary wires No. 2, No. 3 and No. 4, give a standard three-wire system, and any two adjacent wires give a standard two-wire system. For 60 volts, No. 1, No. 3 and No. 5 give the three-wire system, and No. 1 and No. 3 or No. 3 and No. 5 give the two-wire system.

The first difficulty was found in large houses, owing to the drop in long distribution circuits at 30 volts. Under the low voltage system a lamp of the same candle-power as the old carbon took half again as much current at one-quarter the voltage so that the drop per candle-power installed was about six times that formerly. This could be partially overcome by using the proper primary taps before mentioned. But another difficulty was encountered. When the Coil was installed on a residence it rendered useless all the common flat irons, curling irons, fans, sewing machine motors, etc., and circuits controlling this apparatus had to be rewired so as to remain on 112 volts, which was expensive, inconvenient and oftentimes almost prohibitive. However, both the drop problem and this last difficulty were partially solved by adopting a 60 volt lamp instead of a 30 volt. This cut the drop to only one-third more than what it used to be instead of six times. Most of the commercial cooking and heating apparatus can be satisfactorily manufactured for 60 volts. The 60 volt lamp seems no more fragile than the 30 volt was, so that breakage is negligible. Its bulb is our standard 16 candle-power bulb. These low voltage lamps are made in the same standard efficiency as the high voltage lamp, i. e., 1. lw. pc., 1.25 w. pc. and 1.33 w. pc.

In the installation of a large number of Economy Coils of the original pattern with only a two-wire 112 volt primary, difficulty was experienced in maintaining a balance on transformers and the three-wire aerial street system. However, there is now manufactured an Economy Coil with a three-wire 120-240 volt primary, and a three-wire 60-120 volt secondary. This coil simply reduces the whole house voltage suitably for the 60 volt lamp and retains the original balance on both the street wiring and interior house wiring.

Having solved the engineering difficulties in the way of the low voltage tungsten lamps, the next step was its commercial introduction. An investigation of the records of The Hartford Electric Light Company, with 120,000 incandescent residential lamps on meters installed on its lines, showed a net income of $1.10 per year per lamp installed. This gave a good basis for the handling of the low voltage tungsten, on a flat rate, and the following proposition is made to the public:—

Current for 10 c. p. Low Voltage lamp, 10 cents per month per lamp.

Current for 20 c. p. Low Voltage lamp, 15 cents per month per lamp.

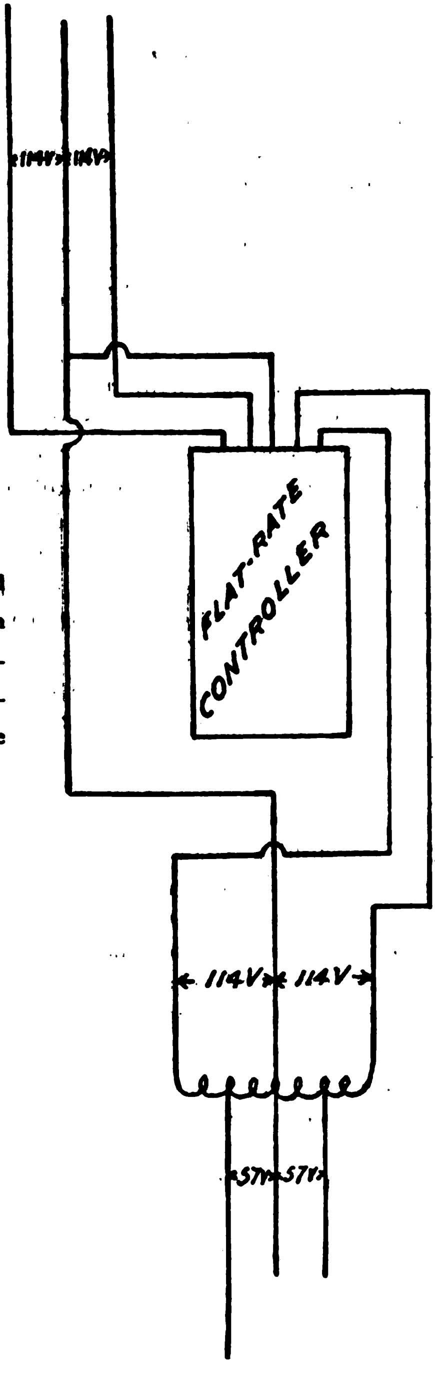
Current for 30 c. p. Low Voltage lamp, 25 cents per month per lamp.

The first installation of lamps to be furnished the consumer at 20 cents each for all sizes. Renewals, all sizes, at 10 cents each. The installation of the Economy Coil, etc., is done free of charge.

Soon after the advent of the high voltage tungsten and its introduction in residences on a flat rate basis, trouble appeared from the customers purchasing 40 watt lamps and screwing them in in place of 25 watt lamps without the knowledge of the company, and this fact necessitated the adoption and use of some sort of a maximum demand controller. Such a device is now manufactured that is practical and reliable for commercial use. When a lamp in excess of the number contracted for is turned on, these Controllers cause all the lamps to flicker until such excess load is turned off. Sensitive thumb screw and spring adjustments make the instrument flicker on an excess load of only 12 watts. With the installation of the low voltage tungsten, the same chance of fraud in exchanging 20 candle-power for 10 candle-power lamps existed, so a maximum demand controller is installed ahead of the Economy Coil properly adjusted for the load contracted for. A very convenient and cheap combination is used of a three-wire maximum demand controller and before-mentioned three-wire Economy Coil as shown in the accompanying diagram.

In connection with the introduction of the low voltage tungsten lamp for residential lighting, The Hartford Electric Light Company's Commercial Department is carrying on an active campaign in the wiring of unwired houses now using gas, etc. We have the following proposition which seems to be extremely popular with the public. A contract job price is made of $35.00, for which the prospective customer's house is properly wired on the three-wire system and six outlets provided, and for these outlets are furnished one 3-light fixture, two 2-light fixtures, one single-light fixture, one bracket and one drop cord, or a total of ten sockets or lights. Then the before-mentioned flat rate prices on the 10, 20 and 30 c. p. Low Voltage lamps are quoted and the deal closed. Thus for $35.00 initial cost and $1.00 per month, a man may have his house wired and burn ten 10 c. p. lamps, etc. If the prospective customer demands a meter, his house is wired for the same price and carbon filament lamps and a meter installed. In case ten lights are not sufficient, extra outlets will be installed with the original contract at $3.50 each, and extra fixtures at the actual selling price. This scheme is not new to this association, The Hartford Electric Light Company having conducted a lively house-wiring campaign two years ago, when 300 houses were wired during the summer. This year's campaign is not so aggressively pushed, however, 80 contracts for house-wiring and the use of the current have been made since June. Most of the contracts run in excess of the 10-light proposition, the average price paid us being $51.99 for an average of 12-10 c. p. and three 20 c. p. lights at an average income per house of $1.65 per month.

THE PRESIDENT. Certainly, Mr. Prince has handled that



Convenient and cheap combination of a 3 wire Maximum Demand Controller and 3 wire Economy Coil.

subject in a very masterly way, and I certainly hope that there will be a very general discussion of the low voltage tungsten lamps. If there is anyone here now who will start this discussion and ask Mr. Prince any question, I should be very glad to hear from him. Hasn't Mr. Osborn some question that he could ask of Mr. Prince, to start this discussion?

Mr. Osborn. Mr. Chairman, in attending several conventions in the west the matter of using low voltage lamps on a service of this kind has been referred to, and some questions have been asked there that I might ask here, that is, whether there is any dissatisfaction upon the part of the users when it comes to the flickering of their lights, also what is the saving where you have to put in and pay for a device for flickering the lights over that of the meter service.

Mr. Prince. Mr. President, our policy in general, is to cover the outlets in a residence with our contract, giving the man the higher candle-power lamps for reading and the lower candle-power lamps in out-of-the-way sockets, and thus we get very few complaints, practically none, caused by the flickering of his lights, because he can burn practically all of them, unless he deliberately goes and exchanges for high candle-power and then, of course, we want him to complain. In regard to the second question, the cost of an economy coil and the maximum demand controller may be nearly what a meter is, but the maintenance is practically nil.

The President. How long have those been in use, Mr. Prince, by your company?

Mr. Prince. We have had them in a year, sir.

Mr. Davidson (Montpelier, Vt.) I would like to ask Mr. Prince if he has any record as to the revenue per kilowatt hour after this system has been installed as compared with the revenue before it was installed.

Mr. Prince. Mr. Davidson, when we first tried this scheme we left the original meter in a man's house on as a check meter, and there is a variation, but we get from 6 to 12 cents a kilowatt hour.

Mr. Holbrook (Excess Indicator Co.) Mr. President, I may be able to give Mr. Davidson some information on that subject that he might find of interest. In Fulton, N. Y., they undertook a plan of this kind in connection with standard voltage tungsten lamps, and introduced a flat rate system on a direct competitive situation. This list that I have is the result of a two weeks' campaign conducted under the direction of the general manager of that company, and will show conclusively what has been accomplished along those lines. These were all unwired small stores and residences, using gas, and to them was submitted a proposition on a flat rate of one cent per watt per mo. for residences and small one-or-two-night a week stores, and two cents per watt per mo. for saloons and drug stores. The result of the campaign for two weeks was to sign up twenty-eight contracts, making a total of 128 25 candle-power lamps, 50 40's, 40 60's and 16 100's, making a total maximum demand of 9.6 kilowatts, for which the electric light company received a monthly income of $155.70, an average of a trifle more than $6 per installation. The total yearly income was $1,868 at the rate of $194.62 per kilowatt per year. That shows a very high income per kilowatt of maximum demand.

The President. Is there anyone else who desires to ask Mr. Prince any questions?

Mr. Carey (Providence, R. I.) I should like to ask Mr. Prince how he handles the heating proposition in connection with these flat rate contracts, if a special service is wired and does he sell that wiring on the regular contract price.

Mr. Prince. We have a rate for flat irons, sewing machines, etc. If it is a large heating proposition we sometimes rewire it and leave it on a meter.

Mr. Vahey (Boston Edison.) I should like to ask Mr. Prince a question. He spoke about the maintenance of the apparatus, the controller and the coil or transformer, as being negligible. I should like to ask him what effect the losses have in the extra apparatus on the lines, in relation to the meters. Are not more losses, added to the meter loss? Does he figures those in? What is the proportion between the losses in the apparatus necessary, and the meter loss?

Mr. Prince. In that price of meter maintenance I have left out the cost of current lost, so that the loss in the economy coil is about half again as much as the loss was in the meter. But you have no expense of reading and consequent lengthy, complicated billing, and no expense of repairs or that sort of thing, no department to maintain or take care of. When the coil is in, it is there, like a transformer on a pole.

Mr. Vahey (Boston Edison.) What I mean is this: Those losses are to be figured somewhere in order to get the net income from that sort of installation. If you have quite a number of those coils on a line you will get core and other losses added to the loss in the transformers. I should think that would bring the income down somewhat.

Mr. Prince. That is true, but still in starting our basis we had the original loss in our meter potential circuits to start us off, and we still got the $1.20 a year per lamp installed, and so now we still get $1.20 per year per lamp installed, but get rid of the extra meter expenses.

Mr. Davidson (Montpelier, Vt.) I should like to ask Mr. Prince another question. Assume that you have your instrument, the maximum demand instrument, set for 1,000 watts, and a customer is trying to beat the flat rate, so to speak, and uses say 900 watts 24 hours a day. How would you get any protection on a situation of that kind?

Mr. Prince. You have none, except that his renewals cost 10 cents, and if he finds out his neighbor does not renew any lamps during the year and he buys two or three sets he finally gets wise that there is not so much to be gained by burning his lamps all night after all.

Mr. Davidson (Montpelier, Vt.) Assume that the electricity had a value to him, he wanted to use it twenty-four hours a day, or twenty hours a day, wouldn't the money that he would make by burning the long hours be more valuable to him than the cost of renewals? Ten cents for a lamp is very low, and of course in the long life of the tungsten lamp he would be the gainer by a long way, I should say.

Mr. Prince. He might, Mr. Davidson, only that would be an experience that we would have to get. A 24-hour consumer ought to get a better rate than one burning short hours.

Mr. Gibbs (Boston Edison.) I should like to ask what the possible attitude of our state gas and electric light commissions toward that is. Isn't it furnishing a special rate to one class of business and discriminating against other classes?

Mr. Prince. I will ask Mr. Rollins to answer that.

Mr. Rollins (Hartford, Conn.) We as yet have no commission in Connecticut. We believe that a contract made between two parties and satisfactory to both will pass, And

I would just like to mention the question that Mr. Davidson asked. A consumer who uses current a long time, of course, is entitled to a very much lower price than a short-hour user. If you had a customer who burned current 18 hours you would sell that current at a very low price. We find on our check meters that residential lights operated on a flat rate basis net us from six to 15 cents per kilowatt hour, therefore, on the average the results are good. The low voltage lamps are especially adapted to the small consumer, for hall lighting, etc. We find many places where they are used to good advantage. Flat rates have existed in Hartford a great many years. As a matter of fact, customers do not burn their lights 24 hours a day; they do, however, abuse the privilege more or less, but the results are eminently satisfactory as we make money all the time.

Mr. Osborn. I wish to correct an impression that has been given with reference to the 50-watt Gem lamp. The life as quoted in the paper is not correct at the present time. The 50-watt Gem lamp is being successfully used by practically all the largest cities now, and is giving a life of over 100 hours better to its 80 per cent. life than the 16-candle-power lamp. With reference to the price of the higher voltage tungsten lamps compared to the 60 volt, the figure was perhaps correct before the recent reduction of about 10 per cent. in the multiple type tungsten lamp. At the present time a 20-candle-power lamp of 60 volts is just the same price as 120 volts. The price of the 32-candle-power lamp at the higher voltage, however, is 10 cents less than the 60 volt type, and the tendency with improvements, etc., coming along from time to time, will be to reduce the price of the 110 volt lamp on account of the increasing use of it. It seems to be a question as to whether we want to go back to flat rates, or not and whether there is any necessity in adopting the 60-watt lamp on account of the fragility of the filament. We don't find that customers are taking that position at the present time. There are a great many 110 volt tungstens in use in residences. It seems as though the plan shown in the paper is primarily for new business, wiring of new houses and getting new business. Cannot that new business be obtained just as well on 110 volts if the wiring is just as well done, side wall switches put in, perhaps, and 20-candle-power lamps used? The possibility of getting even lower candle-power lamps than those now available at 110 volts is encouraging at the present time. When you realize that 20-candle-power 220 volts tungsten lamps are in use abroad at the present time, it would seem as though if we can accomplish the same results on 110 volts it simply comes down to a question of whether you want to use the flat rate or a meter on the tungsten lamp.

Mr. Crowell (Westinghouse E. & M. Co.) I would like to ask the last speaker how long since the standard specifications gave the metallized filament lamp 100 hours more than 450.

Mr. Osborn. It is not a matter of specification; it is a matter of actual test, tests running over the past 12 months. The life to 80 per cent. is equal to 575 hours.

Mr. Crowell (Westinghouse E. & M. Co.) Then you would guarantee a 550 hour life?

Mr. Osborn. Not necessarily, because oftentimes a test shows up very much better than a guarantee of the manufacturer.

Mr. Crowell (Westinghouse E. & M. Co.) Then you would have to take the manufacturer's word for it?

Mr. Osborn. Not necessarily. If the results of any tests exceed the guarantee certainly there is no objection on the part of the consumer, and it shows very good work on the part of the manufacturer. But because your actual test and results go beyond the guarantee it is not a sign that you ought to increase your guarantee each time till you get it beyond the point that you can actually reach.

Mr. Crowell (Westinghouse E. & M. Co.) I know, but some definite figure ought to be established, for the different consumers to use; because one central station might get results different from another. If you gave them a guarantee, with a minimum that they could figure on, they would all be on the same basis.

Mr. Osborn. The guarantee and the figure placed for the life of the 50-watt Gem lamp or any lamp might be placed at the first of the year. If improvements in manufacture actually bring it up to a point where it exceeds this guarantee you cannot keep on changing that figure, but a change will come later and place a higher guarantee on the life of the lamp.

Mr. Rollins (Hartford, Conn.) One more question about the low voltage lamp. It hurt our feelings more or less to know that the price had been reduced in the high voltage lamp and not in the low. I think it is up to the central station managers to associate ourselves together and use a large quantity of low voltage lamps and demand a lower price. For residence lighting especially, the 10-candle-power lamp is used more than the larger sizes, and as yet there is no 110-volt 10-candle-power tungsten lamp made, to my knowledge. We have installed many of the 25-watt 110-volt lamps in residences in Hartford and have found them to be a failure.

Mr. Gibbs (Boston Edison.) I always hesitate to differ in any way about their commercial enterprises with Mr. Dunham and Mr. Rollins, but I have felt for some time that there was no field of importance in residence lighting for a low candle-power tungsten lamp, a ten-candle-power lamp. I have got tungsten lamps throughout by own humble cottage, and the smallest are the 20-candle-power 25-watt lamps, 118 volts. They don't give any too much light. When I go into a room and wish to turn on the light by pulling the chain I want a light. The 10-candle-power lamp does not give light enough. People who are going to the expense of installing electric lights in homes, want something better than they have ever had. They expect it. If you put in small candle-power lamps you leave those people with just a little feeling that they have not gotten quite all they expected. By stimulating the use of more light you make the people more comfortable, and get them to use more and more light where if you try to limit the use to low candle-power lamps you put a handicap, to my mind, on the development of the business.

The President. As the time is fast slipping along it will be necessary to bring this discussion to a close, but I know that we have obtained a great deal of information from the various questions that have been asked and answers that have been given, and no doubt a good deal of good will come from it.

When this convention was called I hoped that we should have with us today a gentleman who has acted as secretary of the Massachusetts Electric Lighting Association, who could give us a great deal of information on that particular point of State Associations, which was referred to in my address of yesterday. I have received today a letter from this gentleman which I shall be very glad to read to show that it was his intent to come if he possibly could. It is dated

Boston, September 8, 1909.

Mr. S. Fred. Smith,
President N. E. Section
National Electric Light Association,
Hotel Wentworth, Newcastle (Portsmouth,) N. H.

My dear Mr. Smith:—

Your kind invitation to attend the first summer meeting of the New England Section of the National Electric Light Association reached me while I was away from home, I have but just returned, and avail myself of the earliest opportunity to acknowledge your courtesy, and to express my regrets that I shall not be able to attend this interesting inauguration of the summer meetings of your Association..

Wishing you and the members of the Association a very interesting and profitable convention, and again expressing my regrets for my inability to attend, I remain.

Very truly yours,
E. W. Burdett.

To show to President Frueauff that there is no question as to the enthusiastic feeling among the gentlemen here regarding the future of the New England Section, and perhaps to stir up a little more enthusiasm if we can, I am going to call upon our Secretary to say a few words in regard to the possibilities in the future of this New England Section. If Mr. Hodskinson will say a few words before we reach our next paper! (Applause.)

(Mr. Hodskinson then addressed the meeting in regard to increasing the membership of the New England Section to include all central stations.)

Mr. Mulligan (Springfield, Mass.) Mr. President, before we take up the next paper will you permit me to present this resolution: That the thanks of the New England Section of the National Electric Light Association be extended to the Portsmouth Board of Trade for the delightful afternoon's entertainment given the ladies attending the convention, and that the Secretary be directed to transmit the thanks of the Section to the officers and members of the Board.

(The motion was adopted.)

Mr. Gibbs (Boston Edison.) I would like to submit this resolution to be embodied in the minutes. I move that the thanks of the New England Section of the National Electric Light Association be extended to the Rockingham County Light and Power Company and its employees, for the very enjoyable entertainment given the members, and the Secretary be directed to transmit the thanks of the Section to the company, its officers and employees.

(The motion was adopted.)

The President. The next paper, and the concluding paper of our session and of this convention today, is on the Hydro-Electric Development of the Connecticut River Power Company, by H. I. Harriman. It is true that the companies located along the coast, particularly at this time, are not so much interested as some of those located nearer the water powers, but owing to the energy displayed by the various hydro-electric companies I think that it is time that perhaps some of us got waked up to see what the prospects are to be for the future. It gives me great pleasure to introduce to you Mr. Harriman of the Connecticut River Power Company. (Applause.)

THE HYDRO-ELECTRIC DEVELOPMENT OF THE CONNECTICUT RIVER POWER COMPANY.

H. I. Harriman.

In the years of 1906 and 1907, franchises were granted by the Legislatures of New Hampshire and Vermont, for the construction of a dam and power house between the towns of Hinsdale, New Hampshire, and Vernon, Vermont, and in June, 1907, active construction work was started. This development is now complete, and is delivering power in Brattleboro, Vermont and in Gardner, Fitchburg and Clinton, Massachusetts.

The dam itself is six hundred feet (600) long and thirty-two feet (32) high above average water. At its westerly end is located the power house and between the power house and the dam itself is a sluiceway for carrying the logs. The dam and the base of the power house are constructed entirely of concrete, the super-structure of the power house being of brick. In the construction of the plant, 50,000 yards of concrete were used, and about two million brick.

In the dam itself are located ten (10) sluice gates and these gates are of sufficient capacity to carry the water of all ordinary floods. By the use of these gates the pond back of the dam will be kept at a practically constant level, irrespective of ordinary fluctuation in the flow of the river, and the control over the pond thus obtained will assure an exceedingly even head upon the wheels.

The Connecticut River is subject to very extreme floods in the spring months, and a rise of fifteen or even twenty feet is not uncommon. As is well known, water wheels will not operate under varying heads with good efficiency, and to care for this loss of efficiency the water wheels have been mounted on vertical shafts and in addition to the two wheels which ordinarily operate each generator, there is placed upon the generator shaft a third wheel, which is designed to operate under the lower head that occurs in time of high water. This is a device which has seldom been used in this country, having been originally developed by Swiss engineers for use on the upper Rhone River. Its introduction in the plant of the Connecticut River Power Company enables this Company to operate its generators at full capacity, even in extreme floods, of from twenty to twenty-three feet.

At the point where the dam was erected, there was no marked fall, but for a distance of twenty miles above the dam the River had, in its normal condition, an average fall of a trifle over one and one-half feet per mile. This very gradual fall gives the Power Company an exceedingly large pond, enabling a considerable storage of water; and further enabling the Company to entirely regulate its use of water during the entire twenty-four hours of the day, the upper three feet of the pond created by flash-boards having a storage capacity of between three and four hundred million cubic feet.

The Power House itself is a structure 250 feet long x 50 feet wide, divided longitudinally into two sections. The up-stream section contains eight generators, each having a normal capacity of 2,500 kilowatts with a continuous over-load capacity of 25 per cent. The down-stream compartment of the power house contains the switch-boards, transformers and high and low tension switches.

The Generators themselves are of the standard water-wheel type, arranged for mounting upon a vertical shaft. They deliver energy in the form of three phase sixty-cycle current at approximately 2,300 volts. The speed of the generators is about 133 revolutions per minute.

Each pair of generators delivers current to a 5,000 kilowatt transformer which changes the voltage from 2,300 to 66,000 and delivers current to three outgoing lines, one of which goes to Brattleboro, Vermont, and the two remaining lines to Clinton and Fitchburg, Massachusetts. In the near future the Clinton line will be extended to Worcester.

The transmission line is built upon a private right of way, 100 feet wide, running from the power house through Southern Vermont and New Hampshire and Northern Massachusetts, in virtually an air line to Fitchburg. There the line deflects southerly to Clinton and Worcester. The two circuits of the line are carried on steel towers, which are erected on concrete bases. Each tower weighs approximately two tons, and is designed to carry, with a factor of safety of two to one, the pressure which would be put upon it if there is a coating of three inches of ice on each wire, and a wind of one hundred miles per hour. The towers are placed about 400 feet apart and all trees and underbrush of every description have been cleared away.

Each circuit of the line is capable of carrying the entire supply of energy, with a drop of approximately ten per cent. This construction gives a duplicate line to every customer and assures continuity of service.

In all of the important towns to which the Company will supply power, sub-stations have been erected. These are brick structures, with concrete foundations, and each station has a capacity of approximately 8,000 kilowatts. In these sub-stations the current is stepped down from 66,000 to either 6,600 or 13,200 volts, the secondary voltage depending upon the distance and amount of the local distribution.

The Power Company has made most elaborate studies of the flow of the River from the excellent data obtained from the various power companies that operate in other places along the River; and from these records it has determined the maximum and average amount of steam capacity which it will require to supply its primary customers with power, during times when the flow of the river is low.

The Company's engineers have determined that with a steam reserve of 7,000 kilowatts it can supply 16,000 twelve hour delivered electric horse-power, assuming an efficiency of 60 per cent. They have further determined that the amount of steam power which will be required in an average year will not exceed six per cent. of the total power delivered to primary customers, and in a year of extremely low water not above ten per cent. The Company has made arrangements with owners of steam plants by which their plants will supply energy to the Power Company in times of low water, and thus the necessity of erecting an independent steam plant has been avoided. It is the expectation of the Power Company to sell practically fifty million kilowatts of primary energy, which the Company guarantees to deliver, and approximately twenty-five million kilowatts of secondary energy which the Power Company will deliver when it has a sufficient water supply and which, in times of low water, it will not be compelled to deliver. It is interesting to note that the output of the Company when operating at full load will equal the output of all the central stations in Massachusetts combined, excepting only the plant of the Edison Company of Boston.

The Connecticut River Company is a corporation organized solely for the purpose of selling power. It is not a lighting company, and it is not its intention to in any way, enter the lighting field, excepting as the power company sells energy to existing electric light companies. Neither does the Power Company expect to enter upon the field of supplying very small users of power, it being its desire rather, to be a wholesaler of energy, disposing of its power to electric light companies and to manufacturing concerns with large electrical demand.

In towns where there are existing electric light companies, the Power Company prefers to distribute its power over lines supplied by the local company thus avoiding duplication of lines.

In the case of the Fitchburg Gas and Electric Light Company with which such an arrangement has been entered into, the Lighting Company agrees to supply distribution circuits for the use of the Power Company to all customers in the City, whose maximum demand exceeds 300 HP, and whose average use exceeds 450,000 HP hours per year. With customers having such demands, the Power Company makes its own contracts and its own rates, and pays to the Local Company a rental based on a fair interest and depreciation charge on the cost of the lines furnished by the Local Company.

The officers of the Power Company appreciate that a hydro-electric plant of large capacity, and with long distance transmission, is a novelty in New England. The feasibility of such plants has, however, been clearly demonstrated in many other sections of the country, and its officers are confident that this development will be of great benefit to the communities through which it passes in supplying them with cheap power.

The President. Certainly the paper given by Mr. Harriman has cleared up the impression in the minds of some companies as to competition, etc., and is very well given indeed. I hope there are members here who will ask Mr. Harriman questions on what he has had to say to us.

Mr. Neall (Thomas & Neall.) I would like to ask Mr. Harriman what provision was made by the Connecticut River Power Company with respect to the requirements now laid down by the American Telephone & Telegraph Company for safe line construction where the lines of the transmission company pass over or come near their own telephone lines.

Mr. Harriman. That matter was taken up very fully with the company. We have no lines in parallel within 100 feet. When we cross over the towers are so strong that there is no conceivable danger of an overturning or breaking of the towers themselves, and the requirements of the telephone companies were that brass caps of large size be placed upon the insulators and that no wire less than 1-0 be used at a crossing. That is practically the only requirement that has been made by the telephone companies.

Mr. Neall (Thomas & Neall.) I would like to ask a further question, if I may. In a state like Massachusetts, particularly where we have a great many small farms compared with the larger ranches that you would have in the west, I judge that it is very difficult to get even an easement for a pole line, and certainly it must be extremely difficult to get the right of way, as I understand Mr. Harriman stated had been secured by the Connecticut River Power Company. Now, I should like to ask what the legal difficulties were that had to be overcome—I mean the broad legal difficulties—in acquiring this right of way. That is to say, is it a purchase outright, or is it an easement, with some clause that enables that property, perhaps, to be taken over again some future day if the original owner wishes to sell the large farm of which this is only a section?

Mr. Harriman. Mr. Chairman, the problem of securing a private right of way was the most difficult problem which the power company had to face. There is no right of eminent domain for power lines in this state, and it was a matter of individual trade with the farmers themselves. The company has had to purchase over 400 rights all told in securing this right of way some 66 miles long. In most cases a perpetual easement was taken by a payment of a lump sum, per tower, which gives the company the perpetual right at all times to maintain and operate its transmission lines. The lines of the company are not fenced off, but, of course, any farmer who goes under the lines does so at his own risk. There is, of course, no danger in doing it unless he is extremely careless. In a few cases the company has bought the fee of the land. It has in every case, however, taken a warranty deed of the easement or fee, and its rights are perpetual and can in no case be disturbed.

Mr. Vahey (Boston Edison.) Would Mr. Harriman please tell us what is the longest stretch from the power station at 66,000 volts,—what is the greatest distance covered,—before stepping down?

Mr. Harriman. Without stepping down? The city of Worcester will be the longest distance, and that is about 66 miles. That is not unusual, in long distance transmission, as companies in California are delivering 200 miles with very good efficiency.

Mr. Vahey (Boston Edison.) The reason I asked the question is this: Of course, this section of the country is so much more compact, and there are so many large cities near together, that I wondered that with the use of such a high pressure just what the longest run might be. In the west, we can see the advantage of the high pressure line where such great distances are covered; here in New England, of course, it would be impossible to run such long distances without going through cities.

Mr. Wilson (Berlin.) I should like to ask Mr. Harriman if he has in mind what their engineer determined as the minimum flow of the Connecticut River at the point which is used.

Mr. Harriman. That is, you mean the extreme minimum in the driest day of the driest year?

Mr. Wilson (Berlin.) No, I mean the ordinary minimum.

Mr. Harriman. An ordinary minimum would not be below 1,800 or 2,000 second feet, but in an extraordinary year, such as last year it might go down to 1,200 second feet. These figures I have given you are based on readings covering every hour of the day for weeks at a time and I think they can be relied on.

Mr. Wilson (Berlin.) I would also like to ask Mr. Harriman, if in this 20 mile flowage you avail yourself of the mill act, so-called, in obtaining eminent domain, or if you bought the land without any condemnation proceedings.

Mr. Harriman. The company has in both states, New Hampshire and Vermont, the right of eminent domain. It, however, was its policy to purchase outright the land it flows. I think that out of some 2,000 acres flowed we actually condemned about 200 acres; the balance of it was purchased and is owned in fee simple.

Mr. Wilson (Berlin.) Was that obtained under the mill act?

Mr. Harriman. No, it was obtained under a special charter. There is no mill act in Vermont.

Mr. Neall (Thomas and Neall.) I should like to ask if there is any agreement existing between Vermont, New Hampshire and Massachusetts, which requires the flow of the Connecticut River, for example, to be maintained irrespective of the individual rights of the Connecticut River Power Company at its own dam.

Mr. Harriman. Of course, in case of any suit it would go to a federal court, and the federal laws would obtain. The question is very difficult to answer, because it has not been thoroughly threshed out in the federal courts, what the rights of each state are. In the case of Kansas vs. Colorado, which was quite an important case decided by the Supreme Court not long ago, the decision was that each state has the right to use the water in that state, as it sees fit, provided its use is reasonable.

Mr. Lewis (Rockville, Ct.) I would like to ask Mr. Harriman if the Bell Telephone Company requested his company, when crossing the Telephone Co.'s lines, to ground each cross arm on both sides of its (the Telephone Co.'s) lines.

Mr. Harriman. Every tower is grounded, and the construction of the tower being entirely of steel, of course, makes a direct ground from the pin to the earth. Each tower also has one leg that is grounded by means of a copper wire terminating in a copper plate embedded in coke.

Mr. Lewis (Rockville, Ct.) I would like to add to that—didn't they request you, in crossing their lines, to do so at right angles rather than diagonally.

Mr. Harriman. Well, approximately at right angles. They did not, however, object to 45 degrees.

Mr. Wilson (Berlin.) I would like to ask what type of insulator they use, suspension type or pin type.

Mr. Harriman. We use the pin type of insulator. We did not think the suspended insulator necessary unless we put up the voltage to 100,000. Suspended insulators require a more expensive tower and were not necessary.

Mr. Campbell (New London, Conn.) I would like to ask if you have had any trouble from lightning, and what protection you have provided against lightning.

Mr. Harriman. We have a guard wire which is carried above the other wires. It is the top wire of the system. Of course, it is grounded at every tower by being attached directly to the steel tower itself. At all sub-stations and power stations we have lightning arrestors. In the last month we have gone through three lightning storms that were quite severe, and no trouble or interruption of any kind has occurred. Of course, there were large discharges through the lightning arrestors, but so perfect was the working of the arrestors that, while there were storms in Fitchburg, in Clinton there was no knowledge of the fact.

Mr. Campbell (New London, Conn.) Mr. President, the development of water power is one of the great problems. To get the fullest use of the water it is necessary to overcome the low water periods. I have understood that Mr. Harriman's company has done this by making reciprocal arrangements with steam plants. Would he mind telling us in a little more detail how it is done?

Mr. Harriman. There is a certain amount of power which even in the lowest times of the lowest years we can deliver without any steam reserves. Then there is above that some power which must be delivered a few days each year by steam. In determining what was primary power our engineers took the amount of power which we could deliver, not furnishing over 5 per cent. of the total yearly energy in kilowatts by steam. We make contracts with customers, (for instance, the Lancaster Mills, who have a steam and electric plant of some 5,000 horse-power capacity), under which we normally supply them power; but in times of low water we can shut them off, and they operate their own steam plants. During the night, when their mill is not running, we have the capacity of their steam plant available for use for night customers. The large pond of the company enables it to use its water to take care of all peak loads, and to put practically a flat load on the steam plant. We have four contracts with large steam plants, varying from 1,000 to 5,000 horse-power capacity.

Mr. Mulligan. (Springfield, Mass.) I should like to ask who maintains the steam plant.

Mr. Harriman. That is a matter of individual contract. Some cases one way and some another, simply as the terms of the contract are made up. As a rule, however, the local parties keep up their own steam plant.

Mr. Mulligan (Springfield, Mass.) Do you guarantee to put men into this plant to operate it? Are they expected to keep it in repair, ready for immediate use.

Mr. Harriman. In the case of two of the steam reserves, which we shall use most frequently, our sub-station is practically a part of the steam plant, and so our own men will be there at all times.

Mr. Neall (Thomas & Neall.) I should like to ask a further question, particularly, of Mr. Harriman, although I suppose it is common knowledge among a number of the men of this company who have steam plant operation: What is the general number of days per year in ordinary times in which a steam auxiliary must be operated to supplant a water power, and what is the maximum number of days in that period that it must be run consecutively?

Mr. Harriman. That question can not be answered generally. It varies with every river. Some rivers maintain their flow much better than others, and some have large storage capacity. In the worst year we will have to operate some steam as much as four months, but in the average year it would be well under three, and there are some years when there will not be an ounce of steam developed in the whole year. Thus far this year we could have delivered the entire output of primary power with possibly ten days exception.

Mr. Chase (Concord, N. H.) I should like to ask the gentleman if he contemplates at any time a complete shutdown on account of anchor ice, and if so how he could maintain his primary load.

Mr. Harriman. We have done everything possible to obviate trouble with anchor ice. It usually forms in quick water, very seldom forms in a large pond. Above us it is practically still water for thirty miles to Bellows Falls, and there another dam makes it still water for another ten miles, so we think the chance of anchor ice is comparatively rare. The company has, moreover, put in an arched fore bay. The water has to go under a partially submerged concrete arch, which comes above the surface of the water and which stands at an angle of about 45 degrees to the dam. Any floating ice or any ice within five or six feet of the surface will strike this arch and will be defected over the dam. The water has to dive some feet to come up inside of the forebay. The Niagara plants had a great deal of trouble with ice, and by the means of this construction they practically obviated it.

Mr. Neall (Thomas & Neall.) I don't want to make a nuisance of my questions, but the question which was just asked suggested another which I had in mind some time ago. I should like to ask Mr. Harriman whether his customers, especially the mills, which have, I judge, excellent steam service of their own, have obliged him to guarantee continuity of service in any degree.

Mr. Harriman. The company makes no guarantee of service against any accident or act of God. It would not guarantee service, for instance, against lightning. It agrees to put in the best construction that it can, but it gives no further guarantee than that.

Mr. Wilson (Berlin) One question. How much power can you deliver in the lowest water of the driest year?

Mr. Harriman. We call our primary development 16,000 horse-power, that is delivered electric power at the end of the transmission line, and in the very driest year it would go down to half that amount. But it won't drop below 10,000 in an ordinary year. In the driest day of an ordinary year there will be over 10,000.

The President. I am afraid that our time is used up, so that we cannot give any more time to the discussion of this paper, but it certainly has been very interesting.

Regarding the convention session, I would like to call a meeting of the Executive Committee at as near 2 o'clock as possible in this room, after which there will be a general executive session at 2.30 P. M. All of our members are invited to be here at that meeting. If there are any votes taken on any subject at the general executive session those will be confined to the class A members, but any discussions or any other business that any of the members may have to bring before this convention must be presented at that meeting.

A motion to adjourn is in order.

(Adjourned.)

AFTERNOON SESSION.

The convention reassembled at 2.55 P. M., President Smith presiding.

The President. Gentlemen, our program this afternoon is very short. There are one or two things that we would like to get cleared up and that will be the end.

The report of the Committee on By-laws has been made, and is in the form of the printed pamphlet which probably all of you have, and have perhaps had a chance to look over. Those by-laws were decided upon after a good deal of thought and work on them, and we believe fit the occasion at this time. It is impossible to establish any by-laws that are going to last for all time, and no doubt there will be certain revisions that will have to take place from time to time. What action will you take on the report of your Committee on By-laws?

Mr. Mulligan (Springfield, Mass.) I move that they be accepted as a whole.

The President. Mr. Mulligan moves, and it has been seconded, that the report of the Committee on By-laws be accepted. Are there any remarks to be made?

(The motion was adopted, 15 or 16 Class A members voting in its favor and none against.)

The President. The next business in order is the adoption of the by-laws. Will some one make a motion to that effect? We have merely accepted the report of the Committee so far.

Mr. Mulligan (Springfield, Mass.) Mr. President, I move that the by-laws as drawn up by the committee be accepted as a whole.

Mr. Lisle (Providence, R. I.) Constitution and by-laws.

The President. You hear the motion, gentlemen.
(The motion was adopted.)

The President. I would like to ask if there is any new business to be offered at this meeting. Has anyone any business he would like to offer? If there is no new business, I want to thank the members and guests for the interest that they have taken, for the courtesies that have been extended to the managers and the Executive Committee, all of which has been highly appreciated, and for the attention that you have given to the papers and discussions and the attendance at all of the sessions. I believe that the convention will go on record as being a very successful one. I sincerely hope that we may increase in membership, and at our annual meeting, which will probably take place in accordance with these by-laws, previous to April 1, 1910, that we shall have a much larger attendance even than we have had here. But it is certainly very gratifying to the officers of the Association to see such an interest taken, and everything has moved off so smoothly and nicely that great credit is due to the committees who have had this convention and program in charge.

That is all, gentlemen, unless some member has something to offer.

Mr. Davidson (Montpelier, Vt.) Do I understand that the proceedings of the meeting will be printed?

The President. It is intended that the proceedings of this meeting shall be printed and distributed to all members of the Association. The by-laws will also be sent to every member.

Mr. Mulligan (Springfield, Mass.) If it is not out of order, Mr. President, I think it would be rather a graceful thing for us to do to instruct the Secretary to send a formal vote of thanks to the hotel management for taking care of us in the way they have and allowing us to have such a good time while we have been here.

The President. Do you put that as a motion?

Mr. Mulligan (Springfield, Mass.) I do, yes, sir.

The President. The motion is made and seconded that the Secretary send to the hotel management an acknowledgment of the courtesies that have been extended.
(The motion was adopted.)

The President. I am thoroughly in acoord with what the gentleman has said, for the hotel management have shown us many courtesies and given us good attention in every way, shape and form. I don't believe we could have found a better place for our initial convention. If there is nothing more a motion to adjourn is in order.

(On motion, the convention adjourned *sine die.*)

Sci 1520.461.

PROCEEDINGS

of the Second Annual Meeting *and* The Second Semi-Annual Convention *of the* New England Section *of the* National Electric Light Association .˙. 1910-1911

The
Second Annual Meeting

PROCEEDINGS
OF THE
New England Section
OF THE
National Electric Light Association

EDISON BUILDING, BOSTON, MASS.
MARCH 17, 1911

Received through
Queens College

OFFICERS FOR 1911-1912

Howard T. Sands, President, Malden, Mass.
Arthur B. Lisle, Vice-President, Providence, R. I.
W. E. Holmes, Treasurer, Cambridge, Mass.
Miss O. A. Bursiel, Secretary, Boston, Mass.

EXECUTIVE COMMITTEE

J. A. **Fleet**, Portland, Maine.
J. S. **Whitaker**, Portsmouth, N. H.
A. F. **Townsend**, Woonsocket, R. I.
R. W. **Rollins**, Hartford, Conn.
Geo. S. **Haley**, Rutland, Vt.
L. D. **Gibbs**, Boston, Mass.
Alex. J. **Campbell** (Ex-officio) New London, Conn.

COMMITTEE ON MEMBERSHIP

Maine.

Jas. A. **Fleet**, Consolidated Elec. Lt. Co. of Maine, Portland, Chairman.
F. D. **Gordon**, Lewiston & Auburn Elec. Lt. Co., Auburn.
T. J. **Brown**, General Electric Co., Portland.
W. L. **Sawtelle**, Bangor Ry. & Elec. Co., Bangor.

New Hampshire.

J. S. **Whitaker**, Rockingham County Lt. & Pr. Co., Portsmouth, Chairman.
John H. **Wilson**, Berlin Elec. Lt. Co., Berlin.
J. P. **Proctor**, Franklin Lt. & Pr. Co., Franklin Falls.
Geo. L. **Sadler**, Nashua Lt., Ht. & Pr. Co., Nashua.

Vermont.

George S. Haley, Rutland Ry., Lt. & Pr. Co., Rutland, Chairman.
E. E. Larrabee, Twin State Gas & Elec. Co., Bennington.
E. D. Blackwell, Neshobe Electric Co., Brandon.

Massachusetts.

L. D. Gibbs, The Edison Elec. Ill. Co., of Boston, Chairman.
G. M. Bates, Westinghouse Elec. & Mfg. Co., Boston.
Chas. B. Davis, General Electric Co., Boston.
Brooks Faxon, Wagner Elec. & Mfg. Co., Boston.
W. J. Keenan, Pettingell-Andrews Co., Boston.
W. L. Mulligan, United Elec. Lt. Co., Springfield.
E. J. Richards, Gardner Elec. Lt. Co., Fitchburg.

Rhode Island.

A. F. Townsend, Woonsocket Elec. Mach. & Pr. Co., Woonsocket, Chairman.
A. B. Lisle, Narragansett Elec. Ltg. Co., Providence.
D. C. Barnes, Pawtucket Electric Co., Pawtucket.

Connecticut.

R. W. Rollins, The Hartford Elec. Lt. Co. Hartford, Chairman.
F. D. Adams, The United Ill. Co., New Haven.
C. E. Smith, Torrington Elec. Lt. Co., Torrington.

COMMITTEE ON STATISTICS AND INFORMATION

Charles B. Burleigh, General Electric Co., Boston, Mass., Chairman.
W. G. Meloon, Twin State Gas & Elec. Co., Dover, N. H.
Chas. A. Learned, Meriden Elec. Lt. Co., Meriden, Conn.
E. E. Gage, St. Johnsbury Elec. Co., St. Johnsbury, Vt.

E. R. Davenport, Narragansett Elec. Ltg. Co., Providence, R. I.
F. D. Gordon, Lewiston & Auburn Elec. Lt. Co., Auburn, Maine.
N. T. Wilcox, Lowell Elec. Lt. Corp., Lowell, Mass.

RATE COMMITTEE

W. B. Bragdon, Presumpscot Electric Co., Westbrook, Maine.
E. C. Newman, Concord Electric Co., Concord N. H.
George S. Haley, Rutland Ry., Lt. & Pr. Co., Rutland, Vt.
L. R. Wallis, Edison Elec. Ill. Co., Boston, Mass.
A. T. Holbrook, Excess Indicator Co., Boston, Mass.
Donald C. Barnes, Pawtucket Electric Co., Pawtucket, R. I.
C. A. Learned, Meriden Electric Light Co., Meriden, Conn.

MASTER OF TRANSPORTATION

C. H. Hodskinson, 70 State St., Boston.

New England Section of the National Electric Light Association.

The second annual meeting of the New England Section of the National Electric Light Association was held in the Edison Building, 39 Boylston St., Boston, Mass., on Friday, March 17, 1911, under the presidency of Mr. Alex. J. Campbell of New London, Conn. Mr. Campbell being unable to be present the Vice-President, Mr. H. T. Sands, presided:

Mr. Sands. Gentlemen, this morning we received word from President Campbell that he had been called to New York rather suddenly and would be unable to be here today.

You doubtless, all of you know the reason for the small attendance here today. Early in the spring the question was brought to the attention of the Executive Committee as to the advisability, in view of the National Convention being held in New York City this year, of doing away with the program part of our March meeting, and attend, as many of us as can, the convention in New York, which will be held the week of May 29-June 3. When that was brought to the attention of the Executive Committee every member felt that as it was a matter which affected the membership at large that it was a question which the Committee ought not to settle. Consequently, it was decided to send out a letter ballot to every member of the New England Section asking them to indicate their desire. The result of the ballot (I have not in figures here) but in every class it was over three to one in favor of dispensing with the program features of the March meeting, and in view of that overwhelming ballot the Executive Committee felt that it was the thing to do. Now, it is to be hoped that we will have a very generous representation of the New England Section at the National Association convention. It is probable that it will be several years before another National Association convention will come as near Boston again. It is furthermore quite likely, in view of the re-organization that is going along, that this may be the last of the large National conventions. Personally, I hope that is true. I think those of us who attended the St. Louis convention realized that the day has come when constructive work can be done much more effectively in the local sections than it will be possible to do in the large National conventions. I very much hope that we will be able to make such transportation arrangements that the cost of the trip can be held down to the lowest possible minimum, and in that way it will enable a great many of our New England members who rarely ever have an opportunity to attend the National convention to attend this New York convention. There are three or four schemes in mind at the present time; none of them, however, are sufficiently developed to warrant bringing them to your attention at this time, but I want to remind you all here to bear it in mind inasmuch as we are the largest geographic section and inasmuch as New York is so near that we ought to have a good generous representation at that convention.

The first thing in order for the meeting today is the reading of the minutes of the last meeting, Mr. Gibbs.

Mr. Gibbs. I did not bring a copy of the minutes with me because it is simply a report of the proceedings of the convention in New London in September. We had a very excellent registration there of about 250 and a good many others who were present as guests. As you, of course, know the convention was held at the Hotel Griswold, New London, Conn., and the program was carried out in detail every way as planned, including the papers that were specially valuable and for which arrangements will be made for printing immediately following this meeting, because it is the plan to print and bind the reports of the two conventions in one volume. This is a saving in expense and at the same time gives us the recorded proceedings in a volume for each year.

You will be interested to know that we are having inquiries from all over the world for copies of Mr. Hunnewell's and Mr. Chase's papers.

The Executive Committee held several meetings in the course of the convention at New London to take care of the varying matters that came up from time to time. A considerable number of applications for membership were made during the convention, which shows how valuable our conventions are simply for maintaining and increasing the membership.

One point that brought up a question at that time was the large attendance of people at the conventions who are not members of the National Electric Light Association, and so of course not of the New England Section, but who all had their commercial interests to represent. There were quite a number of people there interested in social matters, others interested in conventions and commercial propositions connected with central station work, who were present there on their own expenses, of course, but who enjoyed the hospitality and the advantage of being able to meet such a large number of central station men at one time. That has prompted the Section Executive Committee and the Committee on Revision of the Constitution to embody a little provision which coincides with that of the National that anyone, not a member, present at our conventions shall pay a registration fee of $5. That for the majority of them is equivalent to membership in the Association and it is expected, of course, that they will take membership with us if they wish to come and have the advantage of meeting the members at such a time. There was no question raised about the financial characteristics of their propositions and no criticisms made. It was generally supposed and accepted that whatever they had to present to the members was all right, but we feel that the Association should be protected and the membership not be open to solicitation at such a time by some one who is not interested enough to take out membership with us.

Mr. Sands. The next in order is the president's address.

Mr. Gibbs. Mr. President, I had a letter telegram this morning from Mr. Campbell, who has all along expected to be here and has been giving a good deal of time to the preparation of the address that he expected to deliver to us. His telegram follows:—

New London, Conn.

Mr. L. D. Gibbs,
39 Boylston St., Boston, Mass.

Very sorry and much annoyed; unexpectedly called to New York on urgent business. Please express my regrets to Executive Committee and members of Section. Thank all, including various committees, for support and co-operation during past year. Will soon forward short annual report. Chief points. Formative period nearly but not fully passed. Must plan to build steadily and substantially, keeping in view quality of membership and work. Must face possibility of only one convention annually. I want especially to mention efficient work of secretary and assistant secretary and to say Section owes thanks to Boston Edison Company and its president for moral support and material assistance during past two critical years.

(Signed) ALEX. J. CAMPBELL.

Mr. Sands. I know we are all very sorry that President Campbell could not have been with us today, because I know he had more that he wished to say.

ADDRESS OF MR. ALEX. J. CAMPBELL, PRESIDENT, NEW ENGLAND SECTION, N. E. L. A.

In reviewing the work of the New England Section for the past year, I am impressed with the fact that we have been and are still in the formative period.

We represent the largest single section of the National Electric Light Association, and came into being shortly after the National Association amended its Constitution to provide for the formation sections. It was an experiment with the National Association and has been decidedly successful.

There is no past experience to guide us, and both the National Association and we ourselves have been obliged to learn as we progressed, and all the questions as to the relations between us are as yet by no means answered, but are being worked out gradually and harmoniously.

Our most serious difficulty is to confine our expenses within the limits of our income. We might, perhaps, ask for more money from the National Association if it were not facing the same problem.

Although our annual convention in Boston is a very satisfactory affair, I believe that this year we are fortunate in not holding it, thus escaping the expenses, which would make too much of a drain upon our treasury.

This seems the proper place to point out that we may have to consider the necessity of holding one convention a year only, instead of two, on account of lack of income to meet the expenses of two conventions.

We have grown steadily as to numbers, and even more satisfactorily, I believe, as to the dignity and importance of our work.

Covering a limited area, as we do, our members become well acquainted, and this fact, coupled with the intimate and thorough discussion of papers on the floor of our conventions, gives an opportunity for the exchange of knowledge and information among our members that is of great value. It will be more and more appreciated with time, and I look for a steady growth of our Section, both as to members and influence.

It gives me especial pleasure to thank the various committees for their hearty assistance and co-operation, and to speak of the most efficient work of the Secretary and Assistant Secretary. The Section owes them much for the energetic and able way in which the duties of the Secretary's office have been handled.

I cannot close without reminding the members of the debt they owe to the Edison Electric Illuminating Company of Boston and its president, both for moral support and for material assistance rendered in many ways, and particularly for the use of office space and facilities during the past year.

The next in order is the report of the Executive Committee.

MR. GIBBS. Mr. President: The Executive Committee has held since January 1, 1910 eleven meetings. The average attendance of the membership of nine has been seven. Among the important questions that have been considered has been the rate question and the appointment of the Rate Committee consisting of D. C. Barnes as Chairman, E. C. Newman, Secretary, the other members being W. B. Bragdon, Westbrook, Maine; Geo. S. Haley, Rutland, Vt.; L. R. Wallis, Boston, Mass.; A. T. Holbrook, Boston, Mass.; and C. A. Learned, of Meriden, Conn.

A great deal of discussion has been given to the question of whether we shall hold one convention or two, and doubtless that will continue for sometime.

The matter of the proposed new Engineers Building has been discussed at various times and a report will be given on the progress.

A committee was appointed on the revision of the constitution to make it coincide with the recently revised constitution of the National Association, which changes the dues slightly for Class A companies and eliminates the question of extra assessment of Class A companies by making it arbitrary as one-hundredth of one per cent of the gross income up to $1200.

The points of increasing the membership and extending the influence of the Section have been considered at length including the question of how to interest the people in the Maine Electrical Association to affiliate with us and not feel that they are losing their identity as a state organization and the question of co-operating with the Vermont Electrical Association, which has affiliated with the National and the New England Section, for increasing the membership there and getting a larger representation from that state.

I think the Executive Committee is to be congratulated for the faithful interest that has been shown throughout the year. We all appreciate that it means a good deal for busy men to give up their work. In most cases it means a full day, and in some cases the men have to leave their homes the night before in order to get into Boston and give the time required.

(On motion the report of the Executive Committee was accepted.)

MR. SANDS. Next is the report of the Secretary-Treasurer.

MR. GIBBS. It is the second formal report, Mr. President, of the Secretary-Treasurer of the New England Section and covers nine months and a half, March 17, 1910 to January 1, 1911, in accordance with a vote of the Executive Committee making the fiscal year of the Section agree with that of the National Association.

REPORT OF THE SECRETARY-TREASURER,

L. D. GIBBS.

Boston, Mass., March 17, 1911.

To the Members of the New England Section of the National Electric Light Association,

Gentlemen:—

I beg to submit the following report for the year ended December 31, 1910:—

RECEIPTS.

March 17, 1910, Balance of cash on hand	$518.66
April 5, 1910, Rec'd from N. E. L. A. advance on dues	1000.00
June 30, 1910, Rec'd from N. E. L. A. advance on dues	1000.00
Oct. 29, 1910, Rec'd from N. E. L. A. advance on dues	500.00
Dec. 28, 1910, Rec'd from N. E. L. A. advance on dues	250.00
Total	$3268.66

EXPENDITURES.

As per receipted vouchers,	$3,579.90	
Returned from convention banquet and Boston Elev. Ry. Co. (special cars)	477.85	
		$3102.05
Balance of cash on hand January 1, 1911.		166.61

BILLS PAYABLE.

New London Gas & Elec. Co.,	$69.50	
Perry & Stone, Jewelers,	39.40	
Wm. H. Lewis, Convention expenses,	94.00	
		$202.90

MEMBERSHIP—MARCH 16, 1910.

Class A	107
Class B	368
Class D	33
Class E	56
Total	564

MEMBERSHIP—JANUARY 1, 1911.

Class A	109
Class B	407
Class C	2
Class D	41
Class E	115
Total	674

MEMBERSHIP—MARCH 17, 1911.

Class A	110
Class B	417
Class C	2
Class D	36
Class E	128
Total	693

Respectfully submitted,

L. D. GIBBS,
Secretary-Treasurer.

Report on the work of the Assistant Secretary:—The office of the New England Section has been in the Edison Company's building here during the last year under the charge and general direction of Miss Bursiel as assistant secretary. In the course of the year there have been numerous special letters sent in membership campaigns, in the collection of data of one kind and another for the various committees and for our general files. Every time any of us have gone to New York we have learned of something of interest they were doing in the National Association headquarters, or, what has been more to the point with us, we have learned of something it seemed to us ought to be done there or by a section, and we have come home and attempted to carry it out. We want to make our New England Section which is the largest, the most useful, and to make it the most useful it has got to be the store-house. We want the New England Section headquarters to be a very important information bureau. We want all our members to feel that in case of need they can call on us. In case they want any information of any kind they can ask this section and we will make it a point to find it, and we are trying to anticipate the wants of members so as to have that information ready when you do want it. In connection with this work there has been a large amount of correspondence, there have been a great number of pages of tabulated work on operating methods and the securing of data in that connection and there has been a good deal of work in connection with the Boston Edison Company Section. That Section is entirely self-supporting, the company does nothing except furnish this room for them to meet in and so the New England Section headquarters have made it a point to co-operate with the section to stimulate its working and do some of the things for it that the officers have not the time to attend to.

A summary has been prepared giving a good deal of miscellaneous information about our New England Section membership and data of various kinds have been collected from various places for the files. The result has been an average of between 25 and 30 letters in correspondence a day and in connection with our follow-up campaigns and other work there has been an average of about 50 pieces of mail matter a day for the working days of the year, which you see represents a busy year.

MR. SANDS. Gentlemen, you have heard the report of the Secretary-Treasurer. What action will you take on it? It was moved that the report lay on the table until a committee be appointed to audit the accounts and report later at this meeting. The president appointed as the Auditing Committee Messrs. E. P. Gosling, Newport, R. I.; W. T. Oviatt, Providence, R. I.; and Walter P. Schwabe, Windsor Locks, Conn.

MR. SANDS. I wonder if we can have a report on the matter of the proposed Engineers building. I believe Mr. Smith is our representative on the matter.

MR. SMITH. Mr President and Members:—The Committee which has been considering the erection of a building for various societies in Boston have had fourteen or fifteen meetings during the year. They have considered a number of plans and a number of locations and are experiencing how much difficulty there is in arriving at a good location in Boston. That Committee has worked strenuously and effectively and I am able to report at the present time that there is a fair prospect of an early solution of the problem. We have not reached that point yet when we can definitely say where this building may be located and the committee is looking into the matter very carefully to see if they can purchase a certain piece of property that has been offered and I am quite sure if they are successful you will all be pleased with the location. I think perhaps it will be well not to say where that location is because it might have some influence in keeping up the price but I can say it is in a good central location, there is a chance for development and I believe we can carry out the plans that were originally started of having a good club house and also accommodations for our own use. I regret I am unable to report anything more definitely than what I have already stated, but everything looks very bright indeed and I have not a doubt that before many months we will be able to give a very much better report than I am able to do today.

MR. SANDS. It is to be very much hoped I think by every member of the profession that this matter of an engineering building will be successful. I believe that here in Boston, New England ought to support some such building as the engineers have in New York City and I very much hope to see the day when we shall have that building and when our New England Section will have its permanent headquarters there.

The next in order is the report of the special committee for the revision of the Constitution and By-Laws, but before calling for that report I want to make a little explanation in regard to it. A few days ago I learned that Mr. Edgar felt that it would be necessary for Mr. Hodskinson to withdraw from the Executive Committee of the Section and also for Mr. Gibbs to withdraw from the position of secretary-treasurer. As both of these gentlemen have rendered such splendid work in their positions it came to us as a severe blow. I was very much concerned about it and I called upon Mr. Edgar personally to ascertain if there was any real reason other than what appeared on the surface for his action, and I am very glad to assure you that there is none, that Mr. Edgar has nothing but the best feeling toward the Section and the best wishes for the Section but the positions which both Mr. Hodskinson and Mr. Gibbs hold renders it imperative that they should devote their entire time to the work of the company, and in view of that fact he feels they should be released, The Edison Company, as you well know, has done a great deal for the Section. Both Mr. Hodskinson and Mr. Gibbs have given a great deal of their time. Furthermore, we are deeply indebted to the Edison Company for the free use of office which Miss Bursiel has had during the year. I think that we all appreciate to the full what Mr. Edgar has done for us. In view of this change, however, the Executive Committee are going to recommend in the report which you will hear that our By-Laws be changed and that instead of a secretary-treasurer we have a secretary and a treasurer, thereby making it possible if no change becomes necessary in the location of the secretary's office to continue the business of the Association with as little trouble as possible. Mr. Smith will please report for that committee.

Mr. Smith. Mr. President, I have the following motion to make for the proposed changes in the Constitution and By-Laws:—

PROPOSED CHANGES IN CONSTITUTION AND BY-LAWS

New England Section—N. E. L. A.

Article 3—*Section* 4 (*Page* 5).

Insert the word "or" after "and related sciences" omitting the word "and" that is now after "sciences".

Article 5—*Section* 1 (*Page* 9) *Change the section to read:*—

The officers of this Association shall be a President, a Vice-President, a Secretary, a Treasurer and an Executive Committee.

Article 5—*Section* 3 (*Page* 10) *Amended to read:*—

The Secretary shall be nominated by the President and be confirmed by a majority of the Executive Committee and shall serve for one year from April 1st until a successor is appointed or confirmed. The Secretary may be a member of either Class A or Class B in good standing; shall be eligible for re-appointment and shall perform such duties as the Executive Committee may direct, subject to its approval.

Article 9—*Section* 2 (*Page* 16) *Change the section to read:*—

The annual dues of Member Companies (Class A), in cities and towns of less than 5,000 population, shall be ten dollars; in cities and towns of 5,000 and less than 10,000, shall be fifteen dollars; in cities and towns of 10,000 and less than 25,000 shall be twenty dollars; in cities and towns of 25,000 or more, shall be twenty-five dollars, plus one-hundredth of one per cent of the gross receipts from electric sales of the company for the preceding calendar year, providing, however, the maximum amount of dues from any one Class A member shall not exceed $1,250,00.

ARTICLE 9—*Section* 4 (*Page* 17) *Change to read as follows:—*

The annual dues for Class B members shall be five dollars including membership in any one section other than a Company Section, and two and a half dollars additional for membership in each additional section. The annual dues for Class C members, shall be five dollars.

ARTICLE 9—*Section* 6 (*Page* 18) *Amended as follows:—*

The annual dues of Class D members shall be twenty dollars. Each Class D member, however, shall pay to the Treasurer of the Association five dollars for each representative or guest enrolled under its name at the annual convention.

ARTICLE 9—*Section* 7 (*Page* 18) *To read as follows:—*

The annual dues of Class E members, shall be five dollars including membership in any one section other than a Company section, and two and a half dollars additional for membership in each additional section.

ARTICLE 13—*Section* 1 (*Page* 20)

In the first line, note change of word "fifteen" to "ten."

(On motion the report of the Committee on the Revision of the Constitution and By-Laws was accepted.)

MR. SANDS. I may state here that in the matter of voting our By-Laws require that we have 15 Class A members for a quorum. We have exactly that number here.

Mr. Gibbs. I have a letter from Mr. Hodskinson addressed to me as secretary-treasurer and intended to be read to the Executive Committee but it occurred to me that it was such an expression of goodwill and in his usual hearty style that it would be interesting to the members of the Section:—

My dear Mr. Gibbs:—

I wish to advise you that it is my intention to resign as a member of the Executive Committee of the New England Section, National Electric Light Association today, and I would thank you if you bring notice of this action on my part to the attention of the Executive Committee at its meeting at the Boston City Club on Friday, March 17th.

In taking this action, I am very anxious that it will not be construed as a lack of interest on my part in the future of the New England Section, as I assure you I shall always feel a deep interest in the welfare of the Section, particularly as I had the honor of being a real pioneer in its formation.

My action is wholly prompted by pressure of business and by a vast amount of committee work for the National Electric Light Association and other associations, and I do not feel that I can do justice either to myself or to the New England Section by continuing as a member of the Executive Committee.

I wish to take this opportunity also of expressing to the members of our Committee my deep appreciation of the magnificent manner in which they have co-operated with me since the very beginning of our New England Section in carrying out the details in the early days of its formation.

It is a matter of great pride to me that the work of the Section is in the hands of such a highly competent set of officers and committees and their personnel is sufficient guarantee that the association will grow steadily and healthily as years go along.

My keenest regret is that I will be denied the pleasure of sitting around the board with such good fellows and I shall very much miss the enjoyment which I have derived from our close association during the past two years.

With best wishes for the success of the Association and all those connected with its welfare, believe me,

Yours very truly,
(Signed) C. H. HODSKINSON.

MR. SANDS. The next in order is the report of the Nominating Committee, who are Messrs. Walter L. Mulligan, Springfield, Mass.; G. F. Parsons, Woonsocket, R. I.; F. D. Adams, New Haven, Conn.; W. G. Meloon, Dover, N. H. and C. C. Wells of Middlebury, Vt.

MR. MULLIGAN. Mr. President, your Nominating Committee recommends the following:—

For President, HOWARD T. SANDS, of Malden, Mass.
For Vice-President, ARTHUR B. LISLE of Providence, R. I.
For Treasurer, WELLES E. HOLMES of Cambridge, Mass.

For Executive Committee, J. A. Fleet, Portland, Me.; J. S. Whitaker, Portsmouth, N. H.; A. F. Townsend, Woonsocket, R. I.; R. W. Rollins, Hartford, Conn.; Geo. S. Haley, Rutland, Vt.; L. D. Gibbs, Boston, Mass.; Alex. J. Campbell, (Ex-officio) New London, Conn.

MR. SANDS. Before this motion is put I will ask Mr. Whitaker if he will take the chair.

MR. WHITAKER. Gentlemen, you have heard the report of the Nominating Committee. What action will you take on it? The motion is in order to elect these nominees.

(The motion was moved and seconded to elect the nominees as officers for the ensuing year.)

MR. SANDS. I remember several years of attending the production of Hoyt's play, "The Texas Steer." Tim

Murphy in that well-known character, "Maverick Brander," after having been in Congress a short time received a visit from some of his constituents and in conversation with one of them, he made this remark:

"When you send an honest man to Congress and expect him to stay honest, you have given him a blamed hard job."

Now that is just what you have given me, and it is all the more difficult because of the ability of my two predecessors.

However, I hope that with your assistance we shall be able to at least keep up the standard which has been raised pretty high already. I am not going to tire you with any talk or speech today, but I am simply going to say that I am very optimistic as to the future of the New England Section; not only of the future growth of its membership but as to the real value which it may become to central stations in New England. I believe that we can make our secretary's office a clearing house of information.

MR. SANDS. Is there anybody here to report for the Rate Committee? Is there any other matter you would like to bring before the meeting?

The Auditing Committee reported that they had examined the Treasurer's accounts and found them correct. This report was received and placed on file by unanimous vote, and a motion to adjourn was made.

The Second Semi-Annual Convention

PROCEEDINGS
of the New England Section
of the National Electric
Light Association

HOTEL GRISWOLD, New London, Conn.
SEPTEMBER 13 and 14, 1910.

OFFICERS FOR 1910-1911

Alex. J. Campbell, President, New London, Conn.
Howard T. Sands, Vice President, Malden, Mass.
L. D. Gibbs, Secretary-Treasurer, Boston, Mass.
Miss O. A. Bursiel, Assistant Secretary, Boston, Mass.

EXECUTIVE COMMITTEE

J. A. Fleet, Portland, Maine.
J. S. Whitaker, Portsmouth, N. H.
A. B. Lisle, Providence, R. I.
R. W. Rollins, Hartford, Conn.
F. H. Parker, Burlington, Vt.
Chas. H. Hodskinson, Boston, Mass.
S. Fred Smith, (Ex-officio) Salem, Mass.

COMMITTEE ON MEMBERSHIP

Maine

Jas. A. Fleet, Consolidated Elec. Lt. Co. of Maine, Portland, Chairman.
A. S. Bosworth, Brunswick Elec. Lt. & Pr. Co., Brunswick.
W. S. Wyman, Central Maine Power Co., Waterville.

New Hampshire.

J. S. Whitaker, Rockingham County Lt. & Pr. Co., Portsmouth, Chairman.
W. G. Meloon, Twin State Gas & Elec. Co., Dover.
S. P. Hunt, Manchester Traction, Lt. & Pr. Co., Manchester.

Vermont.

F. H. Parker, Burlington Lt. & Pr. Co., Burlington, Chairman.
E. E. Gage, St. Johnsbury Electric Co., St. Johnsbury.
L. J. Royce, The Fall Mt. Elec. Lt. & Pr. Co., Bellows Falls.

Massachusetts.

C. H. Hodskinson, Edison Electric Ill. Co., of Boston, Chairman.
E. P. Rowell, Plymouth Electric Light Co., Plymouth.
W. A. Whittlesey, Pittsfield Electric Co., Pittsfield.

Rhode Island.

A. B. Lisle, Narragansett Elec. Ltg. Co., Providence, Chairman.
E. P. Gosling, Newport & Fall River St. Ry. Co., Newport.
Wm. McGregor, Pawtucket Electric Co., Pawtucket.

Connecticut.

R. W. Rollins, The Hartford Elec. Lt. Co., Hartford, Chairman.
F. D. Adams, The United Illuminating Co., New Haven.
C. E. Smith, Torrington Electric Lt. Co., Torrington.

THOMAS DAVENPORT CELEBRATION COMMITTEE

E. D. Blackwell, Mgr. & Supt., Neshobe Elec. Co., Brandon, Vt., Chairman.
W. G. Meloon, Gen. Mgr., Twin State Gas & Elec. Co., Dover, N. H.
F. D. Gordon, Supt., Lewiston & Auburn Elec. Lt. Co., Auburn, Me.

COMMITTEE ON STATISTICS AND INFORMATION

R. W. Rollins, Gen Mgr., Hartford Electric Lt.. Co., Hartford, Conn., Chairman.
Alfred F. Townsend, Mgr., Woonsocket Elec. Mch. & Pr. Co., Woonsocket, R. I.
G. L. Sadler, Supt., Nashua Lt., Ht. &. Pr. Co., Nashua, N. H.

COMMITTEE ON ENTERTAINMENT SUMMER CONVENTION

Wm. M. Lewis, Mgr., Rockville Gas & Elec. Co., Rockville, Conn., Chairman.
Frank S. Price, Pettingell-Andrews Co., Boston, Mass.
E. R. Davenport, Narragansett Elec. Ltg. Co., Providence, R. I.

MASTER OF TRANSPORTATION

C. H. Hodskinson, 70 State St., Boston, Mass.

The Second Semi-Annual Convention of the New England Section of the National Electric Light Association was held at the Hotel Griswold, New London, Conn.

TUESDAY and WEDNESDAY, September 13 and 14, 1910.

Under the presidency of

MR. ALEX. J. CAMPBELL, of New London, Conn.

OPENING SESSION.

Opening session, 10 A. M. Tuesday, Sept. 13.

PRESIDENT CAMPBELL.

Fellow Members and Guests:—

Before starting my more formal and written report, I want to say a few words of welcome, especially to our guests. We are very pleased to have here several officers and ex-officers of the National Association, and also that we have many guests, and it gives us great pleasure to feel that people think our meetings are worth attending. We want you one and all to feel that you are welcome, to make yourselves at home, to take part in the discussions and in all of the social features of the convention.

To the members I want to say that it gives the officers great satisfaction to see such a large attendance. There is every indication that everybody feels enthusiastic and in the mood for having a good time. I want to ask you, first and foremost, to pay attention to our guests. Wherever you see a man or woman wearing a guest badge, consider it both your duty and your pleasure to see that he or she is having a good time. Don't wait to be introduced. Don't leave it to the Entertainment Committee. Don't leave it to the officers, or anybody but yourself. Look upon it as your own personal duty. Feel that every guest you see here is your own personal guest, and see in every way within your individual power that every guest is having a good time.

Now, as to the meeting itself. I hope you will all take part freely in the discussions, because what we want is the experience of the individual members. I heard of one man who felt a certain degree of hesitancy in discussing one of the papers, but it developed that he had had an experience of importance and one which would be of much interest to every member of the association. Therefore, let no one have any hesitation in taking part. I feel that the success of this convention is entirely in your hands and that it will very largely depend upon the spirit in which you come here and in which you take part in the proceedings.

There are some who claim that New Englanders are cold and reserved. I do not think that it is true. But if it is true of any of the inhabitants of New England, it certainly is not true of the electric light men. To use slang, "loosen up." Become acquainted with each other, become acquainted with your guests. We have the opportunity to make an unusually successful convention, and I think you will agree with me there is no body of men that can rise to an occasion better than the New England Section of the National Electric Light Association.

The next thing in order will be the report of the Secretary-Treasurer.

REPORT OF THE SECRETARY-TREASURER.

L. D. GIBBS.

As you know, our New England Section has permanent headquarters in Boston, with offices in the Edison Company's building, 39 Boylston street. Ample facilities are provided there for headquarters for the members of the Section whenever they visit Boston. As I have explained to a good many of the members, you are at liberty, and we wish to encourage you, to arrange to have your telephone calls come there. Give us the general localities in which you may possibly be found and every effort will be made to look you up in case any communication is received for you from your home plant. Facilities and stationery are provided there for carrying on your correspondence. The office is in charge of Miss O. A. Bursiel, who is the permanent assistant secretary, and whose salary is paid out of the refunds from the membership of the New England Section in the National Electric Light Association. I think from the acquaintance which most of you have with her you will agree she is affable and capable and will in every way make it pleasant for you if you will encourage yourselves to make the headquarters your headquarters when you are in Boston.

During the period since our annual convention, which was held at the American House in Boston March 16 and 17, we have had something over $2000 from the national organization in refunds on memberships. We have used this money to the very best advantage, we believe, and as we feel the detailed reports of the executive committee from time to time show. There are many expenses incident to the management of the headquarters, although the Boston Edison Company makes no charge for the accommodations, and a thousand and one things, in the way of stationery, telephone service, office fixtures, etc., are provided gratis by that company because it is pleased to encourage the work of the Section, which it believes supplements to an important degree the work of the national organization.

Out of these funds we have received from the national organization, all of the expenses of the annual convention, and many of those in connection with the present convention that could be provided for in advance, have been taken care of, and we have a balance on hand of $210.58.

Of course, what we are looking for in work of this kind, especially in permanent work—wherever any one is on a permanent salary, a fixture of any kind in the organization—is results. And I think we have succeeded in getting results from our permanent assistant secretaryship this year that have been a marked compensation for the outlay we have made. You, perhaps, may not all appreciate that the work of this Section has developed to a point where a man in my position has pretty nearly got to choose whether he is going to work for the Section, or to devote a little time to earning his salary with the Edison Company. And it is needless to say that half-work isn't going to give results—isn't going to keep the Section growing and isn't going to make it the important thing the national officers hope and expect from a sectional organization of this kind.

The result of the permanent secretaryship is very nicely shown, I think, in the increase in our membership. March 16, 1910, the date of our annual convention, we had a total of 564 members. Sept. 1 we had a membership of 688, an increase of 124, or 25 per month. Our membership now stands: 107 of the Class A. I regret to say we have no record of increase there. There are about 183 central station prospects in New England but they are pretty hard to pry loose from the $7.50. In the Class B we have 463, an increase of 68. We have 2 of the Class C, 40 of the Class D, and 103 of the Class E, which is an increase of 47.

I think that is a remarkable testimonial to the value of the Section in supplementing the work of the national body.

(On motion, the report of the Secretary-Treasurer was received and placed on file.)

President Campbell (introducing President Freeman of the National Association.) As the members all know, this organization is an internal subdivision of a much larger one. In making it a section of the national body there was given up the original association, an independent body, and I think we all feel that we are very much the gainers by being an integral part of the larger association. To that association we owe loyalty, and from it we receive much assistance and look for much assistance. We believe that our section, will ultimately help out the National Electric Light Association, and we are very sure, indeed, that the National Association helps out our organization. We are very fortunate today in having with us the president of the National Association, and it gives me great pleasure to introduce to you President Freeman.

PRESIDENT W. W. FREEMAN

Of the National Electric Light Association

Mr. President and Fellow Members:—

It certainly is a privilege to meet with the New England Section at this time. The beauties of our surroundings are well supplemented by the cordiality shown by your members and indicated in the opening remarks of your president. One feature of the event which is certainly pleasing to me is the delightful informality. It makes me feel very much more at ease in appearing before you without prepared remarks. I have just come from one convention that lasted longer than this does, and am on my way to a second, with a third not very far off, and those of you who are in the habit of attending conventions appreciate how limited the time is for thought of anything except what is being done at the time. I am more at my ease, still, in the knowledge of the fact that if I forget anything that should be said, Mr. Martin is right at hand to supplement it in his ever ready manner.

The officers of the National Association are giving considerable thought this year, believing that is the desire of the executive committee, to the subject of organization. The association, as you know, has been formed for more than 25 years. It was created originally to meet a demand for some form of organization in the electrical industry. It grew in that natural way and soon had the support of all of the large and important companies and of the individuals who were most active in the industry. But the association has not succeeded thus far in enlisting the official support of the industry as a whole. I mean by that, that there are more electric light companies in the country that are not members of the association than there are companies that are members, while, on the other hand, it is doubtless true that a very large percentage—perhaps 90 or 95 per cent.—of the capita that is employed in the electric light business is represented in membership in our association.

We have felt, however, that if the association is to wield the influence that it ought to wield, it ought to have enlisted in its membership practically all of the companies engaged in the business—that it ought to represent, as has been happily phrased, the organization of the industry as a whole. And that is the object that is being sought in the forms of organization that are being discussed at the present time.

There seem to be three factors which the National Association can best hope to accomplish through the national organization—through the organization which embraces the industry as a whole. These I may term, briefly, education, instruction and protection.

It seems to us that these three elements can be attained in the best manner by means of a thoroughly representative organization throughout the whole country.

The education, you realize, is carried on through our regular system of communication of ideas and plans, our monthly Bulletin, and through the office by means of the committee work that is being carried on along all lines of activity; and I may say our plan this year in connection with our committee work is to make it thoroughly comprehensive—not to have committees simply to meet special things that may arise, but to have the committees cover the entire scope of our work, so that no subject may be brought up as a special matter which would not logically and naturally be referred to some committee that already exists.

Then you realize the instruction that comes to the individual or comes to the company through the combined effort in the national convention and through the work of the organization. That, I am sure, need not be enlarged upon.

The element of protection has, perhaps, not been appreciated in the past as much as it will be in the future. But there is a very distinct element of protection to every company engaged in the business that can be provided through the National organization.

The individual company very often finds itself in a position that is unfortunate, and one where it hardly knows what to do under the circumstances. It needs, in other words, what the small boy often finds in his big brother. The National Association has been able in the past few years, very successfully, to play the part of the big brother to the individual members, the constituent companies. The National Association ought to be large enough and representative enough of the industry to wield an influence throughout the nation on any subject which directly bears upon our own prosperity and success. And it is believed that through the organization which it will be possible for us to effect we can wield a sufficient influence, not only in localities, but throughout the nation, that will afford adequate protection to the member companies in matters in which it is properly interested.

Now, we realize, also, that whereas the National Association can do for its members what cannot be done in any other way, there are functions which it, in the largeness of its operations, cannot adequately perform, and the attempt is being made to localize certain features of our work, not only through geographical sections, such as this, but even down to the company sections, where matters that are primarily local can be handled satisfactorily and promptly. This, as most of you know, is the first and the largest of the geographic sections. You are doing pioneer work in this line. I am sure the congratulations of the National Association are due to you for the success you have won for yourselves up to date, and I think it is important that you realize that you are being watched in this respect and that the work of your organization will be an example in other states that are considering this phase of organization at the present time.

There are separate state organizations in many parts of the country. Some of them have been formed almost as long as the National Association itself, and the question of loss of identity appeals very strongly to the minds of many who have been identified with these local organizations for years. The National Association has not sought in the slightest measure any coercion or any extreme argument in these cases. The officers feel that the problem must find its own solution in a natural way. If there is not mutual profit through this form of organization, it will not succeed and it ought not to be attempted. We are looking to organizations such as yours to work out the problem naturally and to prove to other states, who have their own organizations, that yours is the logical form of organization and the one they ought to adopt. If you don't find in your own practical experience that that is true, we don't want the other organizations to change their methods against their judgment. We do feel, naturally, that this is the form of organization that ought to be followed; that there ought to be the closest relationship between the national organization and its members in the various states; that loss of identity doesn't exist merely by relationship with the larger organization, and that we ought to be able so to effect our organization throughout the country as to have unity of action where it is desired, without sacrificing in any sense the autonomy of the local organization in matters that are largely of a local character.

I want, Mr. President, to express our appreciation of what this organization has done, to assure you that the

National Association will be glad to accord any support that may be desired, and to express our belief that your organization will continue to succeed as it has prospered in the past. (Applause).

PRESIDENT CAMPBELL

(Responding to the address of President Freeman.)

President Freeman, for myself and the members of the New England Section, I want to thank you for what you have said. It has been an inspiration to hear the subject so clearly outlined, and if anybody had any doubt before as to the value of our being a part of the National Association, I am sure that doubt is completely removed. But you have done more than that. You have inspired us and shown us clearly the work that lies before us. I hesitate to use slang in a gathering like this, but President Freeman has very definitely and clearly "put it up" to the New England Section, and I think I can answer for the whole membership that we will never allow anything to be put up to us without making good.

(Vice-President Sands occupied the chair while President Campbell read his address).

ADDRESS BY ALEX. J. CAMPBELL

President, New England Section, N. E. L. A.,
Hotel Griswold,
New London, Conn.,
Sept. 13, 1910.

Members of the New England Section, and our Guests:—

No man could fail to be proud of the opportunity to address such a growing, influential and enthusiastic body as the New England Section of the National Electric Light Association. I certainly appreciate this privilege, but this appreciation is tinged with regret that my place is not today occupied by Mr. James E. Davidson, whom you elected at your last Annual Meeting, and in whose hands I am sure the Association would have made better progress than in mine during the formative period covered by the present year. A telegram sent to him at this time would be very appropriate.

I need make little reference to our growth, which has been rapid, but will make reference to our progress, which I believe has been satisfactory. During the year we have had the benefit of office room very courteously and generously given to us by the Edison Electric Illuminating Company of Boston, for which a vote of thanks and appreciation is certainly due.

Very soon after taking up my duties, the question arose as to whether the Boston office or the president's office should be considered the headquarters of the Section. I immediately decided in favor of the former, feeling that our main work should be carried on there and that all the members should come to look upon our office in Boston as our permanent home. I felt that the location of the president's office was accidental and would change from year to year, and that it would have a demoralizing and disintegrating effect upon the Section if the members felt that the Association changed its headquarters every time a new president was elected.

It next seemed to me that the Association, to justify its existence, must be useful to its members. In other words, each member must be made to feel that the Association either already has rendered him a service, or is in a position to do so at any time. I do not underestimate the value of these meetings and of the papers and discussions, or of the acquaintances and friendships formed. These, I believe, are and must always remain the most valuable part of our work, but other things can be done.

As one step, a committee was appointed to secure information and statistics, to be kept on file at our office, which will thus become a clearing-house of ideas for our members; so that by writing to our Assistant Secretary, any member may be put in touch with what the others are doing in any particular line anywhere in our territory. It seems to me that this is a very valuable and important work, and I have no doubt that the report of the Committee on Statistics and Information will convince you of this fact.

Mr. Davidson suggested that our Section should take some part in fittingly commemorating the life and work of Thomas Davenport, who invented the electric motor, and I took great pleasure in carrying out his suggestion.

Mr. Davenport lived and developed his invention in Forestdale, Vermont.

I appointed a committee to consider the matter, and you will hear from it at this Convention. The committee recommends joint action with the Vermont Electrical Association and the Vermont Historical Society. I heartily endorse its report and trust the Section will enthusiastically carry out the suggestions contained therein. Certainly, we should honor and preserve the memory of the man who invented the electric motor.

Another matter has come up which I feel will ultimately mean much to the Section and all technical and engineering societies in New England. It is the proposition to erect a building and club-house in Boston. You are, no doubt, all familiar with this project. It contemplates that the various engineering and technical societies shall have rooms in the building and that their members will become members of a club likewise to be housed in the same building. This will do for New England what has been done by the Engineering Building in New York and the Engineering Club close by. So far as we are concerned, the only question with the Executive Committee is the matter of expense, and the subject will be referred to you at this Convention for action by the whole Section.

In suggesting a policy to be adopted by this Section, I would recommend that instead of selecting subjects for papers haphazard, we attempt to discuss one or more subjects connectedly in all their phases, the papers and discussions to cover, perhaps, several years. In this way our work will be more definite, and we can feel that various particular and important matters connected with our industry have been thoroughly threshed out for the time being.

Among the most important of such subjects is the question of Rates. At any one time in all lines of business, some one subject is of pre-eminent importance. Rates have been considered in the past; also, Central Station Development from an engineering standpoint, and, not long ago Commercial Development was considered the most vital feature of our work and still retains much of its importance. It seems to me, however, that the matter of Rates and correlated subjects has again come into prominence and should be considered by our Section in all its phases and aspects until it has been thoroughly covered. This for several reasons.

It is true that the question of Rates has been studied by many men, and certain general principles reached upon which our rates are more or less based. In spite of this fact, it is most regretably true that a large number of managers and others interested in central-station development are very ignorant on this subject, and made up crude and ill-advised rate schedules, and it seems to me that our first duty and reason for considering this matter is to spread information and knowledge among our own members, who may at any time be called upon to justify their rates.

In the next place, the introduction of Tungsten lamps and especially of the new wire filament type, must have some effect on our business, although there seems to be a division of opinion as to how serious this effect will be. Some who have carefully considered the subject believe that a wider introduction of Tungsten lamps during the continuation of the present flat meter rates will materially decrease the income of electric central stations, and may seriously cripple some. If the opinion of these men is correct, this is a second and certainly very important reason for studying the question.

Again; heating appliances and other electrical devices have now reached the stage where they must be seriously considered. They have become practicable and useful, and not only will they be demanded by the public, but they offer a source of very considerable revenue. The question whether this business can best be developed on our present systems of charging or by some other, should be carefully investigated. Personallly, I do not believe the flat meter system best adapted to the development of the heating and appliance business.

It is not so many years since all those connected with central stations were striving to get away from flat rates, and the meter was developed as the solution of the problem. Times, however, have changed again, and some companies are going back to the old methods, in part, at least, and are gaining much new business thereby. Whether to do away with the meter altogether and adopt flat rates or some system using a fixed charge plus a low current rate, instead of the present almost universal flat meter rates, is a question that should be given careful thought. Whatever our prejudices may be, we cannot ignore the large amount of new business being acquired by those who are offering some form of flat rates.

Finally, many of us are working under or are facing public service commissions. I believe the more the matter is studied, the more differential rates based on sound principles will be favored, as permitting the highest development of the electrical industry and the greatest extension of its benefits to the public. We must remember, however, that the initiative in devising differential rates must rest upon us. The tendencies of commissions will be restrictive and towards simple and flat meter rates, and unless we take hold of the matter vigorously we may find ruling and precedents so restricting our rate building as to seriously hinder the development of our business.

I believe that any conclusions reached by the New England Section will be favorably considered by the commissions in our several states.

For these reasons I recommend a paper on the subject of Rates at each of our conventions for some time to come, or the appointment of a committee to consider the subject and report, or both, and trust that the appointment of a Rate Committee will receive your favorable consideration.

One matter remains to be touched upon, and that is the question of finances. The income of our Section is derived from a part of the dues paid to the National Association, and while the officers of the Association have been very generous in their interpretation of the constitution, I am not convinced that as the latter now stands it provides the best solution of the problem of furnishing us a sufficient income for our needs. This whole question of the relation of the various Sections to the parent association is an important one, and a committee of which I have the honor to be a member, has just been appointed by President Freeman of the National Association to consider the matter, and I hope that a better arrangement than the present one can be evolved.

I believe that the feeling is growing that the National Conventions are becoming unwieldy and that the way out lies in the sectional conventions. It is the duty of the New England section to prove this by the solid worth of its work and the enthusiasm of its meetings, and I know we can do it.

Mr. Sands. You have all heard this most interesting address of President Campbell. What action will you take with regard to it?

(On motion, it was voted unanimously to refer the President's address to the Executive Committee for consideration).

President Campbell. The first paper on our program is on a question the importance of which I have possibly over-estimated—the question of rates. It is a paper by Howard Corning of the Bangor Railway & Electric Company of Bangor, Me., entitled, "The Advantages of a Uniform System of Rate Making." Unfortunately, Mr. Corning is not present, but Ex-President Smith has kindly consented to read the paper.

(Paper by Howard Corning on "The Advantages of a Uniform System of Rate Making", read by ex-President S. Fred Smith of Salem, Mass).

THE ADVANTAGES OF A UNIFORM SYSTEM OF RATE MAKING

BY HOWARD CORNING,

Treasurer Bangor Railway and Electric Company.

In presenting this paper before this convention I have no hope of giving any new facts concerning electric light and power rates. The subject, however, in view of its importance to central station managers and the increasing demand for electric service by the public deserves close attention, and it is from the discussion which I hope will follow this paper rather than from anything I may say that the greatest benefit will be derived by the members of this Association.

Not the least benefit either in my opinion would be derived if the attitude of central station managers and the basis on which charges for electric service are made was explained to the public at large.

When electricity was first introduced the method of charging was of the simplest and everyone understood it, and today a company starting in a small town will make all its rates of the simplest character. I have in mind one community in my state where I think they are well enough off as they are on this very basis. In large communities, however, the variety of service now offered by the central station as well as the variety of demand that is made by the public calls for a more complex system of charging.

Simplicity of rates is one of the most valuable elements of any system of charging but it can be carried to such an extent that it hinders the growth of the company and works injustice to consumers. It is my opinion that rates will be multiplied as the business grows, provided always that there is some broad ground on which such differences in rates can be founded.

Your secretary when he asked me to write this paper sent me a tabulation of the replies to his letter. Out of the fifty replies that were received about twenty acknowledged that they had special rates and practically all were willing to abandon them. I have an idea that some of these so-called special rates in reality were founded on some broad difference which could be satisfactorily explained.

It would appear from the above that it would not be a difficult matter to find some basis on which a general agreement on rates could be founded. I wrote your secretary in reply to the letter that we should be very glad to co-operate in any general consideration of the question, because we think that special rates which cannot be justified by varying conditions are not good policy for any public service company. It may be as you state in your original letter, that two or three divisions of rates may be sufficient inasmuch as the classification will be very general, but under any number of heads into which you divide rates there ought to be at all times special considerations which perhaps it would be better to leave to the individual companies in order that they may meet local conditions.

The question of what enters into the computation of a satisfactory rate is not the purpose of this paper. There are several able papers on the subject with which you are doubtless familiar. In general it is sufficient to point out the difference between a steam plant and a hydro electric plant for a central station, to say nothing of the wide variation in the cost of coal between an inland town in the state of Maine and a seaboard town in Rhode Island. Again, the central station may be a few miles from the population served instead of in the center of the community, necessitating the maintenance of a high tension transmission line with transformers and line losses.

I find also that there is a wide variation in the franchises under which companies operate not only as between cities and towns but as between states. Again, there are some companies which serve a very much larger population in the summer than in the winter, the result of which is a very much higher rate than if there was a normal ratio between summer and winter business.

These are some of the objections which occur to me against any attempt on the part of this organization to bring about a general agreement of rates. There is, however, one part of the subject which I would like to see taken up. I refer to the broad classification of electric service and the best principles on which charges for this service can be made.

I have read some very interesting decisions and papers on rates in particular localities, but in the time I have had to give to this paper I have not been able to find any discussion of classification of service which would apply to a territory such as one state or a group of states. If this section of the National Electric Light Association could arrive at some classification of various kinds of electric service on which the member companies could make charges according to the demand and their ability to serve, I think it would be of great benefit in helping to solve the rate problem.

President Campbell. Gentlemen, you have heard a very interesting paper and I am sure we all appreciate Mr. Smith's courtesy in reading it for us. The question is open for discussion, and I am going to ask Mr. Lisle of Providence if he has anything to say on this very important question of rates.

MR. A. B. LISLE OF PROVIDENCE ON QUESTION OF RATES

Mr. Lisle. The question under discussion is of great importance. As far as I know no other form of public service corporation has ever tried to establish a uniform system of charging, although the telephone companies come nearer to it than any other on account of their long distance affiliations. Water companies originally almost invariably charged a flat rate of so much a house or so much a faucet, and then the invention of the water meter made is possible to charge according to the amount used, maintaining however, a readiness to serve charge which includes a certain amount of water. Telephone Companies originally charged so much per telephone per year, but experience taught them that a small readiness to serve charge including a limited number of calls and then charging so much a call, has enabled them to increase their business. Gas companies, because they are able to store their product are able to charge so much per thousand feet for the privilege of using whenever, wherever, and for whatever you desire.

Electric companies on account of having no meter, began by charging so much per lamp per month. On the introduction of electric meters the old flat rate was practically abolished. Under certain circumstances this did not work as satisfactorily as it might and a system of charging, utilizing the readiness to serve value was inaugurated. Then again the introduction of higher efficiency lamps made it possible to return to some extent to the flat rate system, so there are now at least three different forms of charging in existence. There can be no argument as to the desirability of a uniform system of charging for all electric companies, but it seems to me that the uniformity must be in principle only and not in detail. Any plan suggested will of necessity require reconstruction for different conditions, such conditions being the varying size of the community, that is, a smaller community must get a greater price than a large one. A system that will apply to a town of under 10,000 cannot be applied to one of 50,000 and a city of 200,000 will require a different rate. The question of the price of coal, whether or not a water power is available, and the general character of the community will all vary the system requirements.

From my experience I am very much in favor of the simplest form of rate possible. It is much easier for a salesman to go out and get business at a rate of so much per K. W. H., with few or no minimums, than with a complex system of charges of so much for the first hour and second hour's burning, with a varying charge for maximum demand in the summer or winter when based on the installation rather than the maximum demand. The simplest system will reduce the complaints of bills and reduce the educational campaign necessary, realizing all the time that any rate which does not embody the above complexities is unfair to the long hour user if it is fair to the short hour user. The principal thing I plead for is that whatever system is adopted it be made as simple as possible. Get down to the basis of our competitors, the gas companies, of so much a unit, use it when, where and as you will.

I should like to arrange to put up a sign in the meeting room of the Committee to whom this matter has been referred "Don't be too Complex!"

President Campbell. Mr. Lisle has touched upon so many points I am very glad to know his remarks are being preserved, so that we can all read them later. He has touched upon almost all the fundamentals, I believe, and it will be necessary to study his remarks to get the full benefit from them. I will ask Mr. Blood of Boston if he can say something on this important subject.

Mr. Blood (Stone & Webster, Boston). Mr. President, I had no intention when I came here of speaking on this subject, although it is one to which I have paid some attention and one in which I am very much interested. The rate question is very much like death and taxes—it is always with us. It is unlike them, however, because death ends all and taxes are settled every year, while the rate question has no end and never will be settled, in my opinion.

The subject before us is "A Uniform System of Rate Making." This title does not invite a discussion of rates themselves, although this is a habit into which many of us fall when we undertake an informal discussion of the matter, but I think at this time it should be avoided. It is the underlying principle, or rather the system of rate making that we are to discuss.

You are all familiar with the different systems that have been tried that I will simply name them—the "flat rate system," the "uniform meter rate system," and then the "demand system" with its various modifications—the "Wright demand," the "Hopkinson," the "Doherty" and others. We have gone through one complete cycle and have come back again and started around the second time. Much of the difficulty, I think, in establishing satisfactory rates at the present time, is due to the fact that the electric light companies insist that they are selling a service while the public believes it is buying a commodity. These two points of view are hard to harmonize. The best way to reconcile them, I believe, is to get our plants on the basis of selling as nearly as possible a commodity, and, on the other hand, to educate the public to believe that they are buying a service.

In order that our plants may sell a commodity we must improve the load factor. To be on a perfect commodity basis the load factor should be 100 per cent. This is practically impossible today but we can hope for a load factor running to 80 or 90 per cent., instead of 20 or 30 per cent. (which is probably what most of you gentlemen have.) When this day arrives, we can begin to sell a commodity and the question of rates will be very much simplified. In order to bring this about, we must have a different kind of business from that which we now have. You can't sell electricity for lighting on a commodity basis. It is impossible. We must secure a business with a better load factor. We have not begun to give this matter the attention that it deserves, but I am sure you will agree with me that the nearer our load factor comes to 100 per cent., the nearer we approach the commodity basis and with it simplicity in rates. The reincarnation of the electric vehicle brings to the central stations the charging of storage batteries, which must improve the load factor considerably. The Therol hot water heating idea, which if perfected and put into practice, is one which will prove the load factor. This device by itself is expected to have a 100 per cent. load factor. The manufacture of ice in connection with an electric light plant so that the machinery may be run at full load all the time is a possibility. We have not solved these problems yet, but each year brings us nearer the answer of 100 per cent.

There are in making rates, I believe, three fundamentals which we must always bear in mind. Mr Lisle has touched on one of these, which I believe should be first and foremost, and that is simplicity. The next one is that rates must be non-discriminatory and the third is that they must be profitable. We have tried for the last ten years to make our customers understand the principles or some demand system of charging, and although we have made great progress, I think we have failed utterly. The public service commissions throughout the country are demanding very strenuously and very properly that rates must be non-discriminatory. I do not think that the public are so insistent on this feature. If they get a simple rate, they are willing to put up with a little discrimination. That must not, however, be excessive. And it goes without saying that the rate we make must be profitable, or we will go out of business.

I certainly hope that some day we may be able to sell electricity as such; that is, sell it as a commodity so that the customer may use it as he wants to, when he wants to and for what he wants to. To do this we must not lose sight of some of the principles we have learned from these demand systems. We must necessarily, I believe, make some kind of service charge—some kind of charge for being ready to give the customer what he wants. We should then. I think, go back to the old kilowatt hour basis, selling a straight metered service. Our customers are familiar with buying coal by the ton, calico by the yard, flour by the barrel. They want to buy electricity in some such manner. And the kilowatt hour basis is, I believe, the right one and the one we will come to. That will have to be supplemented with discounts for quantity and perhaps for prompt payment.

I think that if the three principles to which I have referred are taken into proper consideration, and with the improvement in our load, getting our sales on a commodity basis, we can solve the rate question without much difficulty.

What we should strive for is a uniform system, not necessarily uniform rates. If the time ever comes when we can get a uniform method of establishing rates throughout the country, I think at least half the troubles of the electric light man will be solved. (Applause).

President Campbell. I am sure we all appreciate Mr. Blood's remarks. They show the value of discussion. I thought Mr. Lisle had touched on all the fundamentals, but Mr. Blood brought out a few more. He used a very apt expression. He said in the question of rate making we were on the second lap. Our only hope is that in making this lap we do better than the electric light companies have done in running the first lap. I will ask Mr. Mulligan of Springfield if he will make some remarks.

Mr. Mulligan (Springfield, Mass.) In going about this morning at the request of the President to find one or two managers willing to speak on this subject, I found that some of them were ashamed to mention the fact that they had any rates at all, and others did not know the reason for adopting the system of rates used by their company.

In connection with an investigation our company made some time ago, where one concern had 29 or 30 stores in different New England cities, I do not think we found two central stations out of the 29 or 30 serving those stores where the rates were the same. And we attempted to find out why a rate in Hartford, for instance, was so and so, and in Boston so and so, but we could not find out. They had the rate, but why they had it they did not know unless it was the only rate they could get. And there you are.

So a uniform system is the thing. You can discriminate if you do so in favor of the particular man who kicks. There is no complaint if the discrimination favors him. Therefore, if it is not too early in the discussion, I'd like to carry out an idea suggested by the President, that a committee be appointed to investigate this question, said committee to consist of one member from each state, with a chairman at its head; and if it is found, for instance, that the Hartford system of rates is a satisfactory system, or the Boston system is a satisfactory system, then let the committee investigate it and find out why they adopted this particular system, and make a report and see if, from the information it has gathered, some system cannot be adopted to fit all the cities in New England. We don't care so much about California. It is right here in New England that we are concerned.

A man comes to our town and says that in Bridgeport he had such and such a rate. Why can't we give it to him here? Dig out that information and I think it will be worth thousands of dollars to the members of this association.

President Campbell. Mr. Mulligan shows that he is deeply interested in this subject and has given it considerable thought. He has made a motion which might, perhaps, conflict with the duties of the Executive Committee to which has been referred the President's address. If Mr. Mulligan is agreeable, we would like to have him meet with the Executive Committee; or, if he will withdraw his motion until they have reported, and then offer it independently or in conjunction with the committee, I think that will be a good solution of the problem.

Mr. Mulligan. I think, perhaps, my motion was a little too early. Therefore I withdraw it.

President Campbell. I want to invite Mr. Mulligan to meet with the Executive Committee when it is considering this subject, because we would like to have his suggestions.

We have two special committees and I would like to ask them to report. I referred in my report to the Thomas Davenport celebration. Mr. Blackwell, chairman of the Davenport celebration committee is here, and we would like to hear his report.

Mr. Blackwell. In behalf of the committee on the Thomas Davenport celebration, I should like to read the following report:

Gentlemen:—

We find that the life, experiments and inventions of Thomas Davenport were written up by Mr. F. L. Pope and published by Mr. T. Commerford Martin in the *Electrical Engineer* in January 1891, while editor of the journal. From these articles and information furnished by Rev. Willard G. Davenport, son of the inventor, we learn that Thomas Davenport was born in Williamstown, Vermont on July 9th 1802, that his father was a farmer, who died leaving a large family in poor circumstances, when Thomas Davenport was ten years old, at this age he was bound out to a blacksmith with whom he remained until he attained his majority, he then moved to Brandon and started in the blacksmith business for himself. In the summer of 1833 Davenport saw, for the first time, an electro-magnet, and from that time on was an earnest student of and experimenter in electro-magnetism. It was in July 1834 that he succeeded in turning his first wheel after many months incessant application. Later he applied for and received a United States patent on his motor, a copy of the specifications were published in the articles above referred to.

In 1840 he published a paper in Stanton Street, New York City, the title of which was the "Electro-Magnet".

The press upon which the paper was printed was driven by an electric motor made by Davenport. Davenport subsequently returned to Vermont broken down in health, where he died on the 6th of July 1851, as many another inventor, poor in this world's estate.

Your committee believe that some recognition should be made of a life that was spent in the invention and perfection of an appliance that has proved to be such a great boon to man-kind, the world over, and therefore recommend that a bronze tablet, suitably inscribed, should be erected in Brandon, Vermont, on the spot of his experiments and inventions.

That a committee from among the members of this association be appointed to see to the procuring and erection of such a tablet.

That a reasonable sum be appropriated to carry out the foregoing recommendations.

All of which is respectfully submitted.

E. D. BLACKWELL,
W. G. MELOON,
F. D. GORDON.
Committee.

President Campbell. You have heard the report of the committee on the Thomas Davenport celebration. It very clearly states the object in view, and I think the matter has been very well handled by the committee. They have secured a great deal for very little money to commemorate the life and work of this man. I would like to know if there are any remarks. I will ask Mr. R. W. Rollins of Hartford to say a word.

Mr. Rollins (Hartford, Ct.) I should like to say a word following Mr. Mulligan's remarks on rates. Hartford has perhaps more numerous rates than other companies in New England. And our final results are very good with them. The next session of the Legislature will probably pass a bill providing for the appointment of a public service commission, and it is a question to which we have to give hard study and consideration. We all of us wish to work to maintain as nearly as possible the results which we have already accomplished. Before leaving my office I discussed the rate question somewhat with our president, and I have a memorandum which I will read setting forth our view in a measure on the subject:

The consideration of a proper law concerning public utilities must include some very important and not much talked about facts with reference to the use of capital in investment. We all know that interest on Government Bonds varies from two to four per cent., according to the length of time they have to run and the uses to which they can be put. Mortgages on such properties as trolleys and electric light companies vary from four to six per cent. Of late the best classes are offered freely at about five per cent.

Now in order to attract investment in companies chartered to supply the people with electric light and power, the capitalist must be offered some advantages over and above what he can obtain with good security without any business risk for money invested in such corporations at, say about five per cent., otherwise he will simply buy the bond instead of taking his chances in a somewhat precarious and variable business.

I have placed the following figures together and submitted them as about what would be considered fair by people who have money to invest. In the case of trolley roads and electric light and power companies would say that five per cent. would be allowed on capital employed and secured by mortgages. A well managed electric company which tries to supply to the public what it wants in the line of light and power at the lowest possible price has to bear in mind three sources of expense. In the first place, it must remember that its machinery, owing to the steady fluctuations in its value from excessive wear and tear and from changes and improvements which are constantly being made in the machinery, compels him to buy new machinery in place of old. Second, changes in income growing out of improvements in lamps which have steadily cut down the income of the companies if current is measured by a meter. Third, the necessity of employing very high-priced skill in management, and the class of labor which is dearer than any similar class of labor used by corporations, which comes about from the risks of the business and the necessity of good deal of scientific knowledge which can only be acquired at high-priced schools.

Such a company if faithfully serving the community in which it does business and giving the best quality of service at the lowest possible price to earn at least five per cent over and above the interest on the capital invested at five per cent. An experience of twenty-five years has taught me that three per cent of the capital invested is needed for the maintenance of a company in an up-to-date condition and the best possible repair for service, and accordingly The Hartford Electric Light Company allowed three per cent. for maintenance in their account to the Government submitted with reference to the corporation tax.

The only thing which needs to be considered after these considerations is the proper way to obtain cash for further development and increased business. In a growing town the service rendered under these conditions must necessitate a steady increase of capital for furnishing new machinery and new means for distributing current. For instance, in Hartford the Street Board have decided that the company should spend money for about two miles of underground every year. Now as this new method of distribution does not increase the revenue of the company or materially lessen its expense, it is obvious that it should be paid out of earnings, otherwise, there would be a steady and large depreciation of assets as the old lines must all be taken down. As to other developments for an increased business, there is a question as to whether new capital should steadily be added on which earnings must be made in order to obtain cash, or whether these should be obtained from earnings on the present capital, and this must be most seriously considered for a local point of view in every case.

These figures are not in any way adapted to propositions where money has been wasted, or where stock has been watered in order to obtain unfair returns, but are based on absolute outlay and absolute returns as illustrated in the business of The Hartford Electric Light Company, and in the State of Connecticut must be taken so far as rates are concerned from the general experience of the companies in their business for a term of years.

President Campbell. Mr. Rollins' remarks have confirmed what seems to be the general impression, that this subject is very important, very far-reaching and arouses a great deal of interest. I hope the interest will continue and that a committee will be appointed later on to dig into this matter. Probably they will have to continue digging for several years.

We have still before us Mr. Blackwell's report on the Thomas Davenport celebration. That report very clearly stated the object in view, and I think you will all agree that the memory of a man who did the work he did, especially in those early days, is well worth preserving. I should like to see the Association accept the report and adopt its recommendations. Any remarks?

Mr. Sands (Malden, Mass.) I'd like to move that the report of the committee be accepted and its recommendations adopted, and that the Executive Committee be instructed to carry the recommendations into effect.

(The motion was seconded and unanimously adopted.)

President Campbell. Personally, I want to add a word of thanks to Mr. Blackwell and his committee for the excellent work they have done.

We have another committee, which we appointed to gather information and statistics that will be of use to members of the Association. We shall be glad to hear from the chairman of that committee, Mr. Rollins of Hartford.

REPORT OF QUESTION COMMITTEE & STATISTICS

Mr. Rollins (Hartford, Ct.) I hereby submit a report in reference to the work of the Question Committee which was appointed May 31st in accordance with the vote of the Executive Committee for the purpose of framing a list of questions to be sent to Central Stations, securing information from member companies of New England, to be kept on file at our section headquarters for convenience and reference on the part of its members.

It is not the Chairman's understanding that we are to establish a question box along the lines of the present N. E. L. A. Interesting and unusual questions and answers are desired. Various questions have already been sent out and many answers received, some of which pertain to city lighting contracts, prices, etc., high tension current operated on public streets, life of series Tungsten lamps and manner of ascertaining same.

Your committee believe that the compilation of these questions and answers may be of great benefit to its members.

In connection with the above, I wish to thank Mr. Alfred Townsend and G. L. Sadler for the assistance they have given me in this matter and trust they will continue their good work.

Very respectfully,

R. W. ROLLINS,
Chairman, Question Committee.

President Campbell. Gentlemen, you have heard the report of the committee on questions and statistics. Doubtless, all of you have seen the questions and I sincerely hope that all who have seen them have answered them. That information is on file at the Boston office, where it is being compiled for the use of the members, and undoubtedly further information will be added from time to time. If any of you have any questions of importance to you and would like to know what other members of this Section are doing, I hope you will feel free to write to the Boston office. Doubtless, the information you want is already there, but if it is not it will be obtained. You have heard the report of the committee. Any remarks?

(On motion, the report was accepted and placed on file.)

PRESIDENT CAMPBELL. We have here two telegrams from absent members. I am sure we will all take a great deal of interest and pleasure in hearing from them. They are both very well known and very well liked, and I know that every one of us regret the fact that they are not here today. I will ask the Secretary to read the telegrams.

L. D. GIBBS. At our annual meeting in Boston in March, Mr. James E. Davidson of Montpelier, Vt., was elected President of the Section in natural succession of office. Very shortly after his election he was offered and accepted an opportunity to go with the Pacific Power & Light Company, and his duties called him to the Pacific Coast. He had to resign as president of our Section and, in accordance with the bylaws, the Executive Committee, at a meeting held as soon as possible, elected Mr. Campbell President. This telegram is from Mr. Davidson:

Portland, Oregon.

Alexander J. Campbell,
Griswold Hotel,
New London, Conn.

While several thousand miles separate us, my feelings at heart for the New England Section, its officers, members and guests, are just the same as though I were right there with all you good fellows. May the convention be a perfect success. I send my kindest regards.

JAMES E. DAVIDSON.

There is a genial, round and rosy face I am sure all of you have missed in this convention, and doubtless the signer of this telegram misses being here and we certainly regret his absence. This telegram is addressed to the Secretary of the Section:

"You have my heartiest wishes for a successful convention. The members owe its President and other officers and committees a debt of gratitude for the valuable work which you have all contributed to promote the interests of the Section. I deeply regret that pressure of business prevents my attendance.

C. H. Hodskinson.

President Campbell. What is your pleasure with regard to these telegrams? I think it will be appropriate to have a committee or an individual appointed to answer them.

Mr. Sands. I move that the Secretary be instructed to answer both telegrams.

(Motion adopted.)

President Campbell. Gentlemen, I think not all of us realize what has been the growth of the electrical industry, what its beginnings were and how it has gone on, step by step, growing and developing. Not many of us have the pleasure of knowing practically all of the men who have been prominent, both in this country and abroad, in developing the industry, and I know it will give all of us a great deal of pleasure to hear some remarks from a man who has had that opportunity in his life and who has made the most of it. There is probably no one in the country today who knows so intimately about the growth and development of the electrical industry as the man who laid down other duties to take up the position of Executive Secretary of the National Electric Light Association. In doing that he has done us one and all a favor. It needed just such a shoulder to the wheel and he has put that shoulder to the wheel. And more than that, he is putting in the brains those shoulders carry. It gives me a great deal of pleasure to ask Mr. T. C. Martin of New York to address the members of the Association.

MR. T. C. MARTIN (Secretary, N. E. L. A., New York.) About a year ago it was with such extravagant praise and eulogy as this that I was approched by some of the leading members of the National Electric Light Association with the suggestion that, having worked hard and rounded out a career with fair success, I might be willing to sink into an easy chair and spend the rest of my life, my sear and yellow years, in not comparative but absolute indolence as the Executive Secretary of the National Electric Light Association.

I was an easy prospect. (Laughter.) To such flattery I succumbed, and then I awoke. I attended a meeting of the New England Section—my first official duty. And then I realized that instead of having left all my work behind me, it had but just begun. Then for the first time I knew what the expression "a bunch of live wires" meant. I have taken up the work and have had a great deal of pleasure in it, feeling I can still contribute to the growth of the industry with which my life has been associated.

Getting down from the general and philosophic, to which President Freeman devoted himself so eloquently, let me be specific as to details.

A year ago the National Electric Light Association had about 3100 or 3200 members. At our annual convention in St. Louis, President Frueauff announced, with justifiable pride, that as a result of the campaign which had been carried on by Mr. Scott, under his administration, for a fuller and more complete organization of the industry, it had then reached a total of 5500 members. As I stand here today the record I brought with me from the office yesterday shows a total of 5792. (Applause.)

President Freeman and I had a brief discussion the other day as to what should be the size of our coming edition of the annual proceedings, and we concluded it would be neither wise nor safe to print less than 7000 sets, showing that we believe we have not yet reached the full limit of our expansion and that our hope, and faith in the growth of the New England Section, to say the least, will exhaust the apparent surplus.

We have done a good deal of work in the National Association during the last year along the lines that I was just taking hold of in the beginning of my novitiate. I think one of the most important things has been the publication of our classification of accounts, that being one of the steps toward standardization of the industry imperatively needed. We have just sent that out to every operating company in membership, and depending upon that is a further program of expansion which may be found advisable to adopt, namely, the interchange of information between and among the companies that have adopted our standard classification, so that month by month they can compare in a more or less confidential manner the various details of their business, finding out where they run ahead and where they fall behind. These are two very important aspects of the work of the association in that particular.

President Freeman referred quite modestly to another important innovation or improvement which he has made with regard to committee work. We all know, or those of us who have had experience in association affairs, know that committees are spasmodic and sporadic as a general thing. Very often one individual member has a bee in his bonnet, or has some new fad, or sees sooner than others a new development, or wishes to enforce a new idea. The result is he succeeds in getting a committee appointed. The committee does good work, but the "sky-line" of such committees is exceedingly jagged, as jagged as that of New York city and quite as jagged as some of the curves showing our load factors.

President Freeman has co-ordinated and corelated the committee work of the association, so that it shall embrace and cover all the activities and all the problems of the industry, seeking to group questions naturally together; for example, technical questions in one group, commercial in another group, and so throughout the whole range of subjects. I have watched the growth of the association since its inception, and it has seemed to me each President has brought to his office some message, some inspiration, some new idea. And while this is not the only idea President Freeman has introduced, I conceive it to be one of the most important.

With regard to section work, we have witnessed during the past year quite an interesting development. We have seen a growth in the number of company sections and in their membership. The other day I attended the annual meeting of the Brooklyn section, and that numbered very close upon 400 strong. We had an immensely interesting afternoon and evening in the discussion of some original papers and of some questions brought up in the convention. Fancy a company section of the N. E. L. A. mustering 400 strong at an annual meeting! We hope to have a great many such sections in the near future.

Since I had the pleasure of last addressing you and deriving from you some of the enthusiasm that brought this splendid section into existence, the work of other sections has been taken up—conservatively, diplomatically, as President Freeman has intimated. No attempt has been made to press upon them heavily, to force the issue or strike a deeper note than could be responded to by the city or association addressed. It is very interesting to know that within the past three months we have welcomed into our ranks and into fellowship with you two other states wide apart—Nebraska and Georgia. (Applause.) And President Freeman and I hope in the early fall, when the going is good, to visit Georgia and help put the section there on its feet.

There are two or three other associations considering the question of affiliating themselves with the National Association, but there are problems incidental to the work, where the association happen to embrace gas and street railway and telephone companies, as to what shall be done with that class of membership; and, even more vital and crucial, is what shall be done with associations where they have a class of municipal plant members.

Now, in these days, the lines of distinction as to the operation of public utilities are becoming rather sharply defined. It is becoming recognized that there is a fundamental and vital principle involved in leaving business enterprises to the effort and ambition of the individual, and restricting the sphere of diffusion of public money to such purposes, some often to be squandered, often to be used in illegitimate ways, and never intrinsically for the benefit of the public.

The National Association has taken its stand broadly and squarely on the platform of private operation and ownership, and, therefore, cannot very well or easily tamper with the question of including in its membership those who represent diametrically opposite principles. We want, of course, to hold every gain in our membership. When we carry a state, we want to carry it with a sweeping majority and we want it to stay carried. So that when we welcome into our ranks new associations we desire to have them adopt and share with us the fundamental principles on which we are based.

We have also had another important development, namely, the creation of two new sections, representing branches or phases of the industry—a commercial section and a power transmission section—and they have all the potentialities of growth in their makeup. Here, again, are involved the difficulties of expansion and development, and it is wisely proposed to take up the whole question of our constitutional development as related to sections within our own ranks and as to geographic sections and company sections, with the object that the duties and powers of all may be defined, that the work of the association may be carried on to greater advantage and the industry as a whole be better served.

There yet remains with us the great problem to which President Campbell referred, of getting into membership those who will be most greatly benefited—the smaller companies. As has been stated to you, the association includes today over 90 per cent. of the capital and the earnings of the industry.

The remaining 10 per cent. is represented by the small companies. But evidently the National Association would stand much better in the eyes of the community, as would this section, if we could include in our ranks all the smaller companies; and, personally, as secretary of the national body, just as my good friend Gibbs, secretary of your section must feel, I shall not feel happy until every company has been brought into our ranks for the good of the art. (Applause.)

PRESIDENT CAMPBELL. Gentlemen, I am sure we enjoyed those remarks exceedingly. It is certainly an inspiration to hear from the lips of a man who knows so well of the larger work being done in the larger communities outside of our own and by a larger association than our own. It sets our ideas and ideals on a higher plane and keys us up to better work.

I could not help noting Mr. Martin's remarks with regard to municipal ownership. I think we feel in this section that the national association is opposed to municipal ownership. This section, however, is on record as favoring the admission to our membership of men serving municipal plants. I do not think this can be construed in any way as favoring municipal ownership. We would not, and do not in this matter want to, go counter to the parent association. It so happens, however, that in New England there are men in charge of municipal plants who are very capable and who are very good fellows. Our friendship for the municipal plant man is purely a personal matter. It is a feeling of personal friendship toward these men, who, we feel, belong to us in a way, and while we consider it their misfortune, and our misfortune that they are serving municipal plants, we hate to have that misfortune deprive us of the pleasure of their company. (Applause.) And so we do the only thing we can do. We cannot ask them to come here as members, but we do ask them to come as guests. Possibly there is an ulterior motive, because they may come here and learn the error of their ways and do differently. At any rate, we are very glad to see them, but it is a personal feeling and should not be construed as in any way indicating that we favor municipal plants.

Owing to the pressure of time, we shall have to forego this morning the pleasure of hearing Mr Gibbs' paper on "Illuminated Advertising—Its Possibilities," which is next on the program. Mr. Gibbs has consented to present it after the banquet this evening. It will be illustrated with lantern slides, and I am sure we shall all enjoy it.

(After making some announcements with reference to the social features of the convention, the president at 12:20 declared an adjournment until 7:30 P. M.)

EVENING SESSION.

President Campbell. I have great pleasure in introducing President Freeman of the National Electric Light Association, who will give us a word of greeting.

President Freeman. I assure you it is a pleasure to be introduced to the ladies. Mr. Campbell finds it so extremely easy to say the right thing at the right time without preparation that he seems to think every one else is the same. But I can assure you there is one, at least, who has not that gift. All I can say is that it is a great pleasure to be here today and to meet the gentlemen and the ladies here this evening. It is said that a man who does not know how to play does not know how to work, and I take it that the enthusiasm that is expressed in play, in noise, is the kind of enthusiasm that evinces the desire of the right kind for work. From the evidence that has been forthcoming tonight, you have shown clearly that this organization is composed of men who know how to work, and I wish to extend a cordial greeting from the National Association to that kind of men.

President Campbell. Mr. Gibbs will now present his paper on "Illuminated Advertising—Its Possibilities", which he was unable, owing to lack of time, to give at this morning's session.

"ILLUMINATED ADVERTISING—ITS POSSIBILITIES"

BY

L. D. GIBBS, SUPT. OF ADVERTISING EDISON
ELECTRIC ILLUMINATING CO., BOSTON.

MR. GIBBS. Ladies and Gentlemen:—I do not believe it is necessary to go into an extended discussion of the value of electric signs, or illuminated windows and that sort of thing as advertising propositions of value both to the central station and the customer. In the past the central stations have been inclined to consider themselves. It is more or less the-customer-be-umpty-umped attitude, and they have thought only of the shekels that came in through the cashier's window. Today we realize that it is a very valuable asset to have the approval of our customers, and the motto of which some companies, notably the one with which I am connected, have made considerable capital, has been "A pleased customer makes ten." So it is not only a consideration of what we can get for ourselves out of the man whom we can persuade to have our service, but what we can give him.

I want tonight to mix entertainment with instruction, because I think that in the way of entertainment we get a great deal in the way of suggestion that is no more nor less than instruction, and which will enable us to appreciate some of the possibilities of illuminated advertising.

It is important for every one to consider that in the building up of our business we are gaining a better popular understanding of methods and that better understanding on the part of the customer makes for an increased popular approval of the public service corporation. Every locality has numerous organizations of various kinds. There are business men's associations, improvement associations, women's clubs, church societies and organizations of that kind, and throughout the winter season they hold monthly meetings. Those meetings, of course, have to have their programs, and it is a matter of pride with the organizations to have as interesting speakers as possible.

In the Greater Boston territory there has developed in the last year or year and a half a decided sentiment in favor of lectures by representatives of the different public service corporations, explaining what they are doing and how they do it. That is in accord with the expositions and exhibitions of working apparatus different public service corporations make in connection with fairs held in the different localities. Here are excellent opportunities for the central station to get in their oars.

I propose now to run through the lantern quite a number of slides that will give you suggestions as to how you can entertain the clubs in your localities. I have gathered together in the last three years some 250 lantern slides. I can talk on every subject that it is possible for any improvement association to think of or suggest—all with the same slides. (Laughter.) Now, that is not anything that any man in any central station cannot do. It is just a question of whether you want to give up your time, your Saturday afternoons and evenings and your Sunday evenings or any other evenings in the week, to this kind of work. But I tell you if you do it you will get the greatest return out of it you ever dreamed of. It is something that is popular. Begin your lecture with a cartoon or humorous picture. That always raises a laugh and puts your audience in a pleasant mood. Then follow with a brief history of the development of the electric service. Show a picture of Franklin drawing lightning out of the clouds in 1752. Keeping to a popular discussion of the subject bring on our dear friend Edison and tell some biographical incidents about him.

You can always weave in with the whole scheme something about your company. You simply slide into it so easily that no digression is apparent to your audience. You begin by giving them a view of the central station, and follow this up with something about the coal supply, telling them what a large supply of coal your company keeps on hand and how it can operate its plant in case of a coal strike without any danger of interruption. Then drop into the plant and tell them something about how it is operated, starting in, perhaps, on the turbine engine if you have one. If you only realize when you are talking to your audiences that they want the kind of things they read in the newspapers, you will have no difficulty. Don't forget that. Don't get into technicalities. Don't give them watts and kilowatts and vacuum and low pressure and high pressure, and that sort of thing. Take a few pictures of the engines and explain them in simple English and when the people go away they will have distinct impressions and feel that they have learned something. Follow this rule all the way through. Then when your hearers go out and see a turbine engine or look at the arc-lights in the streets, or the electric light bulbs in their own homes, they have a feeling at once that they have been told and know how those things operate.

Incidentally, you show them something about the incandescent lamp and tell them something about how it is made, all in non-technical language, and in a little while you have your audience understanding your business, or thinking they do. Then, along with that, you give them pictures showing how your building is lighted at night. Then tell them how territory is developed. Follow that with a story about some town you dropped into where there was a station operated by one of the genial old gentlemen of the town. He was born there, grew up there, had his property interests there, married and had all his children there. All his interests are in that town. And people said, "Isn't it a shame for that corporation to come in here and wipe out our little plant." Then take a picture of the old station and show them the interior as it was after you made it into a sub-station—none of the smoke or noise or disagreeable features that were found in the old station. Then tell them how the outside of the station was made a beauty spot in the town. And nine times out of ten that station yard will be a point of attraction in that particular town. And if it isn't, you ought to make it so. That is the part of illuminated advertising where the sun does the illuminating.

Take the audience into your confidence and point out your load curve, giving them some idea of what your station has to do. As an instance—this is an actual fact—I point out to them that in our Atlantic avenue station in Boston there is a million dollars' worth of equipment that is run only a few weeks in each year, but we must maintain it to protect our customers. Do you think that will not make an impression on any customer you talk to?

Following, show the decrease in the cost of electric service by a comparison of sizes of incandescent lamps. And then if you want to take up the electric vehicle proposition, point to the fact that in 1832 they tried traveling in a sort of landau driven by wood-burning engine and thought it was moving fast. You may then call attention to the congestion of traffic in our streets and what a problem it makes for the street commissioners and city authorities everywhere, and then point, perhaps, to a row of electric vehicles and show that everyone of those vehicles takes the place of horse-drawn wagons that occupied four times as much space in your streets. And if you want to get into the spectacular, you point to this General Electric train. I have been informed that on the New York Central railroad, in the vicinity of Schnectady, there are seven miles of track on which the train is drawn by an electric locomotive. I have also been creditably informed that the Empire State express passes that train at 60 miles an hour, as it stands at the station; that they start the electric train, pass the Empire State express, stop, pass it again and stop, four times in seven miles, which is going some.

Then you introduce the subject of general illumination, pointing out the value of adequate street lighting, showing views. You may, if you want to localize the thing, go around the particular town in which you are going to speak and get some night views and show them. For example, here is a night view from Corey Hill, just outside of Boston, and you will be interested to know—a fact which you don't want to fail to call attention to, because it can be proved in night pictures of your own, that this shows more detail than the same view taken in the day-time.

You will find it always interesting, especially if located near a large city, to take a few slides and give your audience a trip in the evening through the business section of the city. Here is a view, taken at random from my collection, of Scollay Square in Boston. It cannot fail to impress an audience. Further on in your talk on illumination, general and municipal, you can point to particular spots in the locality you are talking about. This happens to be a view of Copley Square. They call it now the best lighted square in the world.

I have not been mindful of any particular company, or any particular representative of the "peddlar" profession among my friends, in selecting these slides. (Laughter.) They simply call to mind the different things that are available and how you can emphasize them to the people and the ease with which slides can be made from any illustration you happen to have on hand that you think will be interesting.

After you discuss these things you leave a sweet taste in the mouths of your hearers by taking them through the home electrical. You tell them how electricity is a convenience and a utility, but that it is not expected to supplant the gas range in all cooking. There you have a frankness which is relished by your audience and puts you at once on terms of intimate acquaintance with them. You explain that electricity is labor-saving and the appliances that go with it in the home electrical are numerous and important to consider.

You step upon the piazza of the home electrical, press a button and ring the bell. It never fails to ring. There are no wet or dry batteries to get out of order, and nothing there that "hubby" has to spend time in fixing when he thinks he ought to be resting. Then you take your audience into the home electrical and show them how comfortable it is to step into the parlor, where there is nothing to bump the head of the tall man. That always pleases. Sockets are conveniently arranged and company can be entertained without discomfiture. Take them into the dining room and point out the advantages where fixtures are eliminated and everything made convenient and comfortable for the use of the electric service.

Here I have an interesting story about the husband getting up in the morning and stepping into the cold bathroom, with its hot air register—and you never knew of a register in a bathroom to give out any hot air when wanted—supplemented with the electric radiator "hubby" wants a shave. Of course the range is not started yet at this time of year, and after he has secured hot water by means of the electric heater his pleasure is obvious. Following that comes a trip to the comfortable breakfast table. Those of you who are troubled with the maid problem are always interested in the question of how easy you can get your own breakfast without trouble or inconvenience. At the breakfast table you have the advantage of the toaster. There are several varieties. My next picture is of appealing interest, because you can always get next to the ladies' hearts by calling their attention to the fact that here is a place where pancakes can be made on the table, and first come first served. The husband doesn't sit down at the table and feel himself a hog, eating all he wants while his wife is in the kitchen making the pancakes, but by the electric way the man and his wife sit down together to fresh hot cakes.

You can introduce something entertaining in the way of humorous pictures and your slides may be beautifully colored to show the harmony of interests and pleasing associations that are so impressive to the average audience.

After the breakfast, or preparatory cooking for the morning, you call their attention to the advantages of the electric service for the comfort of servants, and it is one of the points that helps to show how electricity solves the servant problem. Here is a view showing a woman tied to the washtub. This shows her watching the process of laundering in entire comfort with one style of machine and this illustrates another style of machine, where the young lady is taking advantage of a few idle moments to read the morning paper. One thing I found especially impressive is the fact that there is no cranking of the wringer. I wonder how many there are here who have experienced that great pleasure (?) and backbreaking work of wringing out the clothes on wash-day for mother back on the farm?

Then, of course, comes the ironing, which is solved by the electric iron; and the morning cleaning, which is accomplished throughout the household by the vacuum cleaner. You can show numerous slides along that line. Simply take the general circular of any of these companies and reproduce on the slides any of the pictures you think will serve your purpose.

It is always interesting to point out the advantages of the electric appliance for the lady in the home, while the husband is in the city on the business of the day. It is always a lonesome proposition for a woman to spend the day at home, while the husband is in town, but if you present the picture as this young lady appears, sitting at the table enjoying the mid-day meal, it is likely to assuage a good deal of the loneliness of the situation. After luncheon, the lady may have some sewing to do, and of course she does it on a motor-run sewing machine, which takes one stitch or a million.

Any picture or cartoon that appeals to you can be cut out, and, if not located where you can get it done in your own town, you can at least in a nearby city have some man who makes lantern slides reproduce it for you.

One of the possibilities of the vacuum cleaner is shown in cleaning a lady's hat. This always appeals, because you know how difficult it is to get the dust out. Then there is the curling of the hair for those whose locks are not naturally curly, and they use the electric iron. And after all those little affairs connected with the toilet are completed, the young lady does not have to worry about her appearances or about belated callers, because she can sit at her desk and run over her correspondence, or sit anywhere and keep cool and comfortable by the use of the electric fan. After the callers arrive, she makes tea on the electric stove and entertains her friends, perhaps, with chocolate and a chafing dish. You can show the comforts of the den, which appeals to the husband always, because he has the advantage of the luminous radiator to make everything comfortable. In the evening after the theatre there is no danger from spilt alcohol, for they can use the electric chafing dish.

More elaborate views of the chafing dish process may be shown and the following that, if there is any difficulty with the quality of the rarebit, the electric heating pad properly applied does the business. (Laughter.)

It is always interesting to point out how electricity has revolutionized the milk supply. The cows are milked by electric process, the milk drawn into large tanks and kept perfectly free from and uncontaminated by any odors from the stable. And following that this perfectly sanitary milk is introduced into the electric milk-warmer. Of course this is the only way in which milk should be warmed as a food supply for babies, and it is rather surprising that they grow up under any other process. Following the delivery of the milk to baby an electric heating pad may be put near it to protect from threatening chills of cold weather. And then we always point to those people who happen to be less fortunate than their neighbors, and call attention to the fact that if they can't hatch the babies, they can at least hatch the chickens in electric incubators.

I desire now to call your attention to some illuminated signs. It is important to consider, in the matter of electric signs, that originality is a vital point. You can't expect to sell a jeweler a sign because his neighbor has got one, unless you have a different design to present to him. His pride, if he amounts to anything, and is able to buy a sign, will keep him from buying one like that displayed by his competitor. You must be on the job to present to him something different. You have to sense the popular sentiment as to whether your town wants signs to advertise itself. In Boston we happen to be engaged at the present in a co-operative movement. We are placing in each town a sign which calls attention to the distance from Boston, to the fact that there are desirable locations for stores, factories, etc., at reasonable prices, and that electric power for factory purposes is cheaper than steam or water. It is counting, and it is bringing us a great return in popular sentiment and appreciative attitude on the part of the people. These signs can be shown in different ways.

The proof of the pudding always is in the eating, as is shown by such signs as the one of the Knoxville Railway and Light Company. You will be interested to know that the Allegheny Light and Power Company has a sign on its big office building in Pittsburg at the present time that contains 2400 lamps. It is over 200 feet long and 50 feet high, and can be seen from a great distance. Every central station must have its own electrical advertising, or it can't expect to interest other people in the value of that kind of publicity.

One of the hardest propositions in illuminated advertising is the newspapers. It is very difficult to convince them that it is of any value to them to advertise their own business. They take advertising from everybody else, but are not likely to go outside to advertise themselves.

You can adapt these lectures and slides to every conceivable subject. It is easy to answer the call for lectures on "The History of Electric Lighting," "The Past, Present and Future of Electricity," "Electric Service Solves the Servant Problem," "Store, Window and Sign Lighting," "Electricity the Physician of the Future," "The Conservation of Our Natural Resources," "The Home Electrical," "How a Rain Drop makes an Electric Light," "Drug-store Lighting," "Factory Lighting," "The Best Power for Factories," etc., etc.

My idea has been to show you that any subject your are called upon to present to your constituents—you can prompt these calls, I might suggest—will bring you a great return. Your audience can but feel that you come as a representative of your company—you or some of the people on your staff. They represent you. They are talking for you. No matter how many words they use and how little they say, the general audience is bound to be impressed and pleased by the attention you have given them.

Here are views showing how gas illumination of a store can be transformed to the use of the electric service; the removal of a gas arc from outside the store, and the substitution of proper illumination inside the store window, throwing the light down upon the goods; a view of a store window where the lighting has been made very effective, and of course is impressive to the average merchant. You can find lots of opportunities to talk to merchants' associations, and there you can give them the best sort of illuminating engineering talk, advise them how to handle their business, take care of their customers and put them in a position where they will be comfortable and happy, by the use of a proper arrangement of electric lights.

I spoke of the value of suggestion in advertising. It may be illustrated by a picture of a nice, large stein of beer. The light on the body of the sign flashes out showing the name; that disappears, and then you see the froth, which foams up and runs down over the side.

This sign reading "Lunch" is a general type which, if you are simply considering the idea of getting a few more lamps on your system, is all right. But it has no originality about it. It is simply a sign with sockets in it, which makes it possible for your collector to go around once a month to get your money. A restaurant keeper who has a sign of that kind is likely to be dissatisfied, or very careless of his results. It is originality that counts every time.

It is worth while to consider at this point some arguments in favor of electric display advertising gleaned from current publications.

"The women everywhere admire the displays because the electric signs help brighten the city."

"The electric interests of all classes in any city speak favorably of electric signs. The real estate interests are also keen to see signs go up."

"Electrical advertising cannot be overdone. Darkness was made only to sleep in. The police department voluntarily protects electric signs and everybody has an interest in them."

"Electrical display is the only kind of advertising that people will read repeatedly and with delight and every time they see it·"

"The readers do not have to buy it in order to read it."

"Readers do not forget what they see or forget to talk about it with their friends."

"Electrical advertising enhances the reputation of the product advertised. It puts on the gilt edge. It is the difference between an engraved card and a printed one—lends the piano finish, so to speak."

"The cost of electrical advertising is a minimum considering its circulation; that is, the number of people who see and read it."

"Electric advertising carries with it a lot of free publicity. It is bound to show up on souvenir cards, appears in photographs reproduced in city-promoting literature, etc., etc."

"Increasing the number of readers does not increase the cost, nor does the increase of contemporaries lessen the advertising value."

If you want to get a clear idea of the importance of an illuminated clock on a street, observe where they have had one and have discontinued it temporarily· You will find how much attention it has been attracting among the general public. It costs very little to illuminate, it only takes a few lights, but you don't want to forget that it runs from dark until daylight.

Even our friends in the gas business come to us for help. One electric sign says: "Get a gas range." We don't mind the gas range if it is advertised with electric lights.

It is important always to please the general public, especially if you can do it without very much outlay of money. Take it on election night, for example. You can easily get permission to stretch a curtain across the street from your office. Then put a little notice in the newspapers saying you are going to give returns on election night, take the ordinary little glass plates and print the returns on them with a pen, slide them through the stereopticon and please a host of people, who will be impressed at once with your kind attention.

It is important always to remember in the suggestive value of electric signs that they are worth more to the merchant than to you. Any man that you send out to canvass for electric signs should appreciate the customer's point of view, and work with the idea of helping the customer and not simply building up the central station load. I hope that as a result of my suggestions it will be possible to supply the demand for speakers before the various improvement associations. I thank you for your attention. (Applause.)

SECOND DAY

Wednesday, Sept. 14, 1910.

President Campbell called the convention to order at 10:30 A. M. and said: I am informed that some of the members feel we did not have enough discussion yesterday on the question of rates. That is unfortunately true, but perhaps it is just as well. I am sure the matter of rates will be taken up at our next meeting in March. I am making this announcement now so you can all come prepared to discuss the subject. The program for the March meeting is not yet made out, but very likely a whole session will be devoted to a discussion of this one subject, and with this announcement it will be possible for all those interested in the matter of rates to give it further study, and I hope every one will come prepared to discuss it thoroughly.

There is to be a very interesting meeting soon in Vermont, and the chairman of the committee having the matter in charge is here and I would like to have him make an announcement, because some of our members might like to go.

Mr. Blackwell. I hope none of you will wait for a special invitation. We shall be glad to welcome you all. We shall have to provide rooms outside of our hotel for some of the single men, and if you will kindly advise either Mr. Marston at Manchester, or drop me a line at Brandon, Vt., we will see that you are all taken care of and give you a hearty welcome when you get there.

President Campbell. We were prevented from having any discussion of Mr. Gibbs' very interesting paper last night, and I think it gave us all some new ideas. From the title of the paper I had no idea what he was going to say, and he took a line that was new to me and very suggestive. Are there not some members present who would like to discuss that paper? Mr. Rollins, what do you think of that educational work in Hartford?

Mr. Rollins. I think it is good, but I have nothing to say on the subject.

President Campbell. Isn't there someone else who would like to discuss the paper?

Mr. Sands (Boston, Mass.) Just one thought occurred to me while Mr. Gibbs delivered his paper. I go to New York, or walk the streets of Boston, and then go into some of our own towns where we have our plants and I feel sick at the lack of electric signs. Of course there is one thing that militates against the sign business, and that is some of our local ordinances. But I wonder if our solicitors in approaching a sign prospect realize the comparative value or the comparative cost. An electric sign, or an electrically illuminated window running until 10 or 11 o'clock at night, affords the merchant an opportunity to reach a large number of people —a larger number of people than he could possibly reach at the same cost in newspaper advertising. You have the salesman who is always on the job, who never complains when he has to work overtime and who is not connected with any union movement. I think this is a feature that we sometimes don't realize fully ourselves and fail to impress upon our customers.

Mr. Frank B. Rae, Jr. (New York.) There is one thing, it seems to me, of which the officers of this section should take some cognizance, and that is the fact that there is a good deal of agitation going forward against electric signs. In Times Square, New York, a building has been erected primarily for the purpose of hanging electric signs on it, a "lobster palace," with a tower to accommodate the signs. The *New York Times*, having a building right across the street, of which it is very proud, is starting to raise a good deal of trouble about that bunch of blazing signs that promises to put the Times Building in the shade. The *Times* is agitating the question and throughout the country the agitation is being copied by other newspapers, all protesting against electric signs. Those New York newspapers come into your territory pretty regularly, and especially among people who are likely to buy signs, and it seems to me that some steps might be taken to carry out the idea that was expressed yesterday as regards protection for electric signs.

Mr. F. C. Bates (New York). I do not think the New York papers object primarily to the electric sign as such, but they do object, as I understand it, to its extreme vulgarity in many cases. I think one of the stands this section can take in the electric sign matter is to guard against that phase of the situation. Any one who has walked up and down Broadway knows that some of those signs are in extremely bad taste, and New York, while it should be one of the most beautiful cities in the world, is one of the ugliest, because any one feels at liberty to put on his building something that suits him, without respect to what his neighbor has. That is not permitted in the finer European cities and probably will not always be permitted in American cities. But it is the extreme vulgarity, I repeat, of many of the electric signs in New York to which the papers object.

MR. BURLEIGH (Boston.) I do not think opposition to the erecting of electric signs would naturally be of much moment in New England, for the New England inhabitants, you know, are credited with being more or less superstitious, and for that reason should naturally believe in signs. (Laughter.)

MR. DAWES (Pawtucket and Woonsocket, R. I.) Referring to Mr. Sands' remarks in making comparison between electric and newspaper advertising, it might be well to state here that the salesman, in soliciting electrical advertising, must be a diplomat at all times. We have to use the utmost precaution to guard against newspapers taking a rap at us now and then, and I do not think it is a very good plan to send a salesman out and tell him to draw comparisons between electrical and newspaper advertising. We know all kinds of advertising are good, and we know electrical advertising is about the best advertising one can possibly get for the money. But it might be well, in soliciting sign business, to state that the electrical sign increases the value of a man's newspaper space. I think we are getting into deep water when we make comparisons between electrical and newspaper advertising, as far as cost is concerned, if we want to keep the good will of the newspapers on our side.

Mr. Davenport (Providence, R. I.) I can tell you an experience we had in Providence. A large whisky sign was erected there on the roof of a building. It was 30 by 40 feet and contained 1000 lights. It advertised whiskey, unfortunately. We considered we were doing a rather good sign business this year up to the time that sign was erected. But the church people objected to the whiskey sign and stirred up a lot of popular agitation against it. The different churches held meetings and one of the local newspapers took it up and devoted something like half the front page to pictures of this whiskey sign. The result of all this agitation was that the city council adopted an ordinance making very stringent regulations governing the erection of signs, and it is now impossible in Providence to erect a sign like the whiskey sign.

President Campbell. Is the ordinance so worded as to cover the character of the sign, or does it refer to the mere fact of the sign itself? Could you erect a good sign with the same number of lights?

Mr. Davenport. They didn't prohibit the advertisement of the whiskey by electric signs. I don't believe they could do that. It is a legal traffic, and I don't believe it would be legal to make such a prohibition against it. But they prohibited the erection of large signs on the roofs of any buildings that do not advertise the business in that particular building. For instance, the proprietor of a clothing store could put up an electric sign on his roof advertising his business, but that sign would have to be built in accordance with these new rules and regulations in regard to clearance under the sign, height of sign, construction of frame-work, etc. I believe no wood is allowed in signs and there are a lot of other details. This happened right in the midst of our compaign for sign business, and at the present time, in view of this feeling, we do not consider it the psychological moment to push electrical signs. We are waiting for the agitation to die out, with the hope some day of trying to get these regulations modified. A few days before I left I saw in the newspapers that the commissioner of public works had called attention to an old sign ordinance that had not been enforced, which provided that these signs should not be hung further than six inches in front of any building. The commissioner pointed out that practically all of the electric and other signs now erected are in direct violation of this old ordinance. It looks as though we might expect further trouble.

MR. CHASE (Concord, N. H.) There is an ancient adage to the effect that good wines needs no bush. And perhaps, in view of the experience they have had with the whiskey sign in Providence, it might be a wise measure for us not to advertise whiskey, on the ground that good whiskey will speak for itself.

MR. TEFFEAU. (Rockville, Conn.) Mr. Davenport woke me up when he spoke of having trouble. This past summer I was in Washington and on one of the buildings on Pennsylvania Avenue there was a large sign advertising beer. Washington has an ordinance prohibiting the erection of any sign on any building, excepting to advertised goods sold or manufactured on that property. A church across the way was very indignant at the beer sign, and they put up a sign on their church, paid for by popular subscription, to counteract the effect of the beer sign. But the beer people came back with the old ordinance and asked them what was manufactured or sold in that church. In consequence, gentlemen, the church sign is out and the beer sign is lighted.

MR. PRINCE (Hartford). That reminds me of an experience we had in Hartford. We had from 150 to 200 small signs on drug stores, cafes and clothing stores, and one on a Baptist church. The common council of Hartford, egged on by a body of citizens called the Municipal Art Society, succeeded in interpreting the ordinance so as not to allow any projection of these signs beyond the building line. As the building line in most business streets where we had these signs was the property line, the signs were ordered down, or about 125 of them; I think we have 60 or 70 left. The Municipal Art Society even went so far as to employ an attorney to watch the common council to see that the ordinance was not tampered with, or any legislation started to change it. But I may remark that the church building referred to is so far back of the property line that the First Baptist Church sign still remains. As matters stand now there is no chance for signs unless they are flush with the building, and those don't seem to be as popular as the signs that project. So the sign business in Hartford has been knocked sky-high, for the time at least.

MR. FRANK B. RAE, JR. (New York.) Being an advertising man, I want to point out, in view of the fact that the subject of whiskey signs has come up, that few reputable newspapers or magazines will accept whiskey advertisements. And it seems to me that some of the ethics of the advertising profession should be adopted by the companies engaged in electrical advertising. The whiskey and beer people are rather hard put to find adequate advertising mediums, and they have lit on the electric sign as about the best they can possibly get. It seems to me that if the central station men would look into the ethics of their local newspapers or go to the standard magazines, like *Collier's* and *Everybody's*, they will find that many of the signs now on their circuits transgress the ethics of advertising. Certainly we have much at stake, and when magazines refuse thousands of dollars for advertising space, it seems to me the central stations ought to be able to take the same stand.

MR. HAYES (Fitchburg.) The last speaker has referred to the desirability of refusing certain business. I just want to raise the point whether that would be possible. It seems to me that, perhaps, we may have to take the business as it comes. We can, of course, refrain from soliciting certain classes of business, but it seems as if that would be as far as we could go. I think this condition would obtain in Massachusetts and perhaps all over the country.

President Campbell. Mr. Hayes has raised an interesting point.

Mr. Davenport. In Providence the Narragansett Company has an exclusive franchise, and other companies represented here probably have exclusive franchises. Under those conditions I do not see how it is possible to discriminate and refuse electrical advertising of whiskey or beer or any legal commodity that comes along. In the case of the whiskey sign I referred to, the business did not originate with us. The advertiser came there, selected the place and put the sign up. We were not responsible for the business. We were glad to get it, nevertheless. Shortly after the whiskey sign went up, two signs were erected advertising beer. I don't see how you can discriminate very well against liquor advertising.

Mr. Sands. Regarding the point Mr. Hayes has raised, I think the exact phraseology of the Massachusetts statute is that we must furnish electricity to all who may apply for it, "under reasonable terms and conditions." Just how the courts would interpret that clause "reasonable terms and conditions" if we should refuse current for a purpose which in our opinion was objectionable, I do not know. It is quite a point, however.

Mr. Spike (Cambridge.) Cambridge has prohibition, and we have had two or three liquor people come to Cambridge soliciting electric sign locations. The matter has been turned over to me and we simply put them off from time to time, failing to quote rates or pay any great amount of attention to the business. In that way we have forestalled the installation of liquor signs in Cambridge. We do not think it would do us any good to have them there.

President Campbell. If any one had any doubt as to whether the electrical business had advanced in all respects, it would be set aside by the fact that we are sitting here now discussing questions and ethics and public morals. It marks a long advance.

If there is no further discussion, I will, before proceeding to the next paper, call on Mr. Blood to remark on one or two subjects—one in particular, which I think is of great importance to electrical central stations.

Mr. Blood (Boston.) You, gentlemen, will remember the old Association of Electric Lighting Engineers of New England. When that organization was disbanded, there was a small fund left in the treasury, which was turned over to a committee, of which I was chairman, to be disposed of as seemed best. Inasmuch as the old organization included municipal representatives, it didn't seem best to the committee to turn the fund over to this association, and the committee has voted unanimously, if the plan for the engineers' building in Boston goes through, that the fund shall be turned over to the building committee of that association. In this way the municipal representatives, as well as those representing the companies, may if they see fit get the benefit of the fund. It is a very small fund, I think some $24.00, but I make this report so you may know what is to become of the money.

The other matter I asked permission of the president to speak on is in reference to a new society just formed in New York City called the Electric Vehicle Association of America. I believe a large proportion of the central station men in the country still look upon the electric vehicle as more or less of a joke. I feel that this is particularly true in New England, and I know that our New England inertia hurts us in this case, for we are very much behind the times. The object of the association is to promote the adoption and use of the electric vehicle for business and pleasure purposes. The membership of the association is made up of manufacturers of electric vehicles and storage batteries, publishers of trade papers and central station men. The central station people will probably carry the control of the new organization. At a meeting about ten days ago the constitution and by-laws were adopted and the officers and directors were elected. The slate is as follows:

OFFICERS

For President:
William H. Blood, Jr., Stone & Webster, Boston, Mass.
For Vice-President:
Arthur Williams, The New York Edison Co., New York.
For Treasurer and Assistant Secretary:
Harvey Robinson, The New York Edison Co., New York.
For Secretary:
C. E. Firestone, Columbus Buggy Co., Columbus, Ohio.

BOARD OF DIRECTORS

H. H. Rice, The Waverly Company, Indianapolis.
F. W. Smith, United Elec. Lt. & Power Co., New York.
P. D. Wagoner, General Vehicle Company, Long Island City, N. Y.
Louis Burr, Woods Motor Vehicle Co., Chicago.
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Frank L. Dyer, Edison Storage Battery Co., Orange, N. J.
James T. Hutchings, Rochester Rwy. &. Lt. Co., Rochester, N. Y.
Louis Ferguson, Commonwealth Edison Company, Chicago.
W. W. Freeman, The Brooklyn Edison Co., Brooklyn, N. Y.
F. M. Tait, The Dayton Lighting Co., Dayton, Ohio.
Hayden Eames, Cleveland, Ohio.
Charles Blizard, The Electric Storage Battery Co., Philadelphia.

This organization is getting to work very actively. I presume some of you know that a fund was started by the Electric Storage Battery Company, and to that fund subscriptions were made by the electric vehicle people and some of the central stations. That fund has now been turned over to this association and amounts to several thousand dollars. We hope eventually to have somewhere between $25,000 and $50,000. I think there is no doubt whatever that we will easily have $30,000 and possibly more to spend in advertising the electric vehicle as such—no particular make of vehicle or battery—simply to educate the public in the use of the electric vehicle. That is simply one of the points the association is to take up.

You gentlemen in New England are slow. The city of Rockford, Illinois, is said to have one electric vehicle for every 100 or 120 inhabitants. You all know what they are doing in Rochester, N. Y. You know that in New York all of the breweries have electric trucks and that many of the department stores have them. They are ordering them now at the rate of from $50,000 to $75,000 at a time while most of you gentlemen are asleep.

This society was formed to wake up the people throughout the country and to show those who have had unfortunate experience with electric vehicles in the past that a new era has arrived and that electric trucking is a commercial success and for the central stations a profitable business. If all the trucking in New York City were done by electric vehicles, and the charging of the batteries was at the regular rates for power, it is estimated that the income to the New York Edison Company from that source alone would amount to $50,000,000 a year. Very likely they will never get all of this, but if they got one-tenth of it they would have an income of $5,000,000 from that source, and that is entirely possible and very likely probable within the next few years.

It is a business well worth going after. One manufacturer alone, of electric vehicles, has $1,500,000 worth of trucks going through his factory at the present time. I just mention these items to show you the importance of this phase of the electrical industry. This new association has been incorporated and very shortly you will have sent to you details of its formation and copies of its constitution and by-laws. You can profit by joining it and through your co-operation it will be made a success.

PRESIDENT CAMPBELL. We need very little more than the mere statement of Mr. Blood to wake us up, that the electrical vehicle has become practical and useful, because we see before us now opportunities for the selling of current that none of us, probably, realized existed.

MR. SMITH (Salem.) At yesterday morning's session Mr. Mulligan of Springfield suggested that a committee be appointed to consider the question of rates, and following out that suggestion I should like to make this motion:

That a committee be appointed by the president, consisting of one member from each state in the Section, with the president as chairman, to investigate the question of rates and report the information obtained at our next convention.

PRESIDENT CAMPBELL. Mr. Sands, will you please take the chair? As this concerns the president, he prefers not to preside, but would appreciate it very much if that motion could be amended so that someone else might be the chairman of that committee. This for several reasons. Perhaps the most important one is a desire to shirk the work. Another is that I think it is better for the president not to be chairman of a committee. I would rather let some member handle the matter, and I think it can be done to better advantage if it is handled by someone who is free from the care of the general work of the association. And if Mr. Smith is willing to make that change in the resolution, I am sure the president will appreciate it very much, believing as he does that it will result to the advantage of the association.

Mr. Smith. I will change the resolution to read "Vice-president instead of president.

Mr. Sands. It seems to me the easiest solution of the difficulty is to let the president appoint the committee and let the committee choose its own chairman.

Mr. Smith. I accept the amendment, and withdraw that part of the resolution which stipulates that the president shall be the chairman of the committee.

President Campbell. As the chair understands the motion, there is to be a committee of seven appointed by the president and they are to choose their own chairman. Gentlemen, I think you all understand the motion. What is your pleasure?

(The resolution was unanimously adopted.)

President Campbell. Before we proceed to the next paper on the program, I think there are one or two votes which we ought to pass extending our thanks to people who have shown us courtesies.

Mr. Rollins. I move that we extend a vote of thanks to Lieutenant-Colonel Rafferty for the courtesies extended by him to this association, and that the secretary be instructed to notify him of our action.

(The motion was unanimously adopted.)

Mr. Rollins. I move, also, that a vote of thanks be extended to those who furnished the association with automobiles.

President Campbell. Those automobiles in which the ladies went riding this morning were furnished by gentlemen in New London.

(The motion was unanimously adopted.)

Mr. F. C. Bates (New York). On behalf of the guests, I wish to express my appreciation of the charming courtesies shown to us by our genial host and charming hostess. The New England section is to be congratulated upon having such an interesting and instructive meeting, and the courtesies shown to us have been unexcelled.

"SPECIAL AND DECORATIVE STREET LIGHTING"

By J. A. Hunnewell,

General Superintendent Lowell Electric Light Corporation.

What Is It?

To New England cities, special or decorative street lighting should be better street lighting. Is not this rush to special or decorative street lighting throughout our country an hysteria resulting from too long suppression of efficient, complete and satisfactory street illumination?

To change our present system of street lighting to an ornamental one need not include elaborate posts, fixtures and lamps, but, instead, possibly a re-arrangement of the present equipment and introduction of more units with resulting better lighted streets.

Do We Want It For Our Cities In New England?

The best for our customer is the best for our company. Properly lighted streets are the best customer on our lines and we should foster this service more faithfully than that of our largest store. In the latter, we urge the use of the most modern equipment and make sure that the best results are given, while with the streets we, at times, are not so persistent.

Too often our cities have been unwilling to pay for the latest or best system of street lighting, unwisely believing the expenditure not warranted. In the system in use, frequently the lamps are not installed to the best advantage for good street illumination, but are located in a manner to place the city officials in the good graces of certain tax payers by flooding their frontage with light, and of certain other tax payers by keeping their frontage in darkness.

The fault lies not wholly with the cities in every case, for the Central Station has the burden of responsibility, and may have at times failed to recommend an *efficient street lighting system*, explain its advantage and value that the city officials might understand, and also failed to effectively urge its adoption.

Today, the streets of some New England cities are lighted with old, open arcs and carbon filament incandescents, long since surpassed for this work by the enclosed arcs and tungstens, which in turn are being hard pressed by more modern units.

In many of our New England cities and towns the street lighting systems are composed of old, crooked, spike-chewed poles, supporting and supported by cob-webs of wires and shredded insulation, and from these poles arc lamps are hung by means of mast-arms,—a cross between a horse rake and a dumb-bell.

To erect in their place clean, wooden or iron poles with neat, supporting crooks for the lamps, and straighten out the over-head wiring would produce such a shock to the citizens that further improvement would be unwise.

If we want the citizens to know that they have a good Electric Light Company, we must give good street lighting. Ninety per cent. of our citizens see the Electric Light Company in the street lighting service. Each of them can tell when the streets are well lighted and is pleased.

In the days of old, city improvements were made when public safety or comfort compelled, but today great effort is being made to create a more beautiful city. We should not endeavor to light the city as necessity demands, but rather light it in keeping with modern progress.

Street lighting has reached the stage where it becomes something more than a silent police officer. We must have our city comfortable and beautiful at night as well as by day. Street lights no longer serve as beacons only, by which to trace one's course, but should serve to illuminate the streets to make a nightless day for travel.

The value to our cities of better lighted streets is positive. You, yourself, shun dark alleys and seek well lighted streets. The best lighted street carries the greatest crowd. Increased lighting increases traffic, and where traffic is most dense the property value is the highest.

The well lighted streets of our city will bring trade for our merchants from the out-lying districts; will give the visitors a pleasing impression of our city, and will shed an atmosphere that encourages civic pride and progress among our citizens.

For the Central Station to increase street illumination is to increase its income, not only from the city, but from the merchants, who find that brilliantly lighted streets make their stores dark by contrast.

We need fear no criticism for advising our municipality to purchase better street lighting. We may fail more fatally by not urging better street lighting and taking the initiative than by awaiting the inevitable awakening of and action by the city. We are public servants, but we serve the entire public in the street lighting only. Let that be good street lighting.

WE WANT BETTER STREET LIGHTING. HOW SHALL WE GET IT?

The improvement will be greatest in the business section, and we must determine whether to look to the merchants or to deal with the city. Over 75 per cent. of such improved lighting installations in our country, all in the western cities, have been paid for by the abutting merchants or property owners. Why? Does the fact that in nearly all of these installations the movement originated with the merchants themselves, and not from the Central Stations signify that the latter were remiss?

The merchants of the East are not those of the West; here they make money by saving it; there they make money by spending it. It is quite uneasternlike for our merchants to club together and demand that this lighting be furnished at their own expense. Why should we expect them to do so? Why not expect the property owners or tenants along our business street to pay the cost of expensive pavement, extra police protection and extra fire protection? These merchants and property owners are among our heaviest tax payers, and street lighting is in the line with expenditures for street building, fire and police protection, and benefits in a similar manner the public as a whole.

When merchants band together for this improvement, the result is often unbalanced lighting throughout our business sections; here a blaze, and there a blank. Also banding of our merchants from side to side of the street, or from street to street, does not tend to harmonious spirit of co-operation among them for the public good.

However, of the thirty installations, concerning which I have been able to obtain this information, twenty-six were made by the banding together of merchants, three by request of the city council, and one by the efforts of a private contractor.

Whether we look to the merchants or to the city, our method of obtaining it will be the same. Inform the people. Newspapers will aid with descriptive accounts of this lighting in other cities, and point to the possibilities for our own city. These accounts may be accompanied by effective advertising in these newspapers by the Central Station, outlining tentative plans for an installation and benefits to be derived therefrom. You will find some party in the city government or among the merchants who will gladly carry the attack along, and a judicious amount of personal solicitation by your commercial force among the property owners and merchants will bring up the rear. At the proper time install the proposed system along some block or street that they may see the contrast and improvement.

If your Puritanic spirit will permit, the night the completed installation is first lighted give the public a band concert (as has been done in the West) that the event may make a permanent and favorable impression.

In passing, the time to take the matter up with your city may be when your street lighting contract must be renewed. Your income can be maintained or increased and the city served and pleased as well.

WHAT KIND OF AN INSTALLATION SHALL WE SELECT?

We should eliminate the spectacular and choose the system that will give the best practical service to our city. If advertising is the paramount requisite,—four or five search lights properly installed and flashed intermittently now on the streets, now on the heavens, would be effective. Local conditions govern the selection of the proper system to install. If the streets are covered in with shade trees, or are narrow and crooked, tungstens are best, since arcs must be placed at greater distances to be efficient. Arc lamps do not lend themselves for strictly decorative lighting as do incandescents, but produce fully as good illuminating results and minimize the number of poles and fixtures on the streets.

If economy is imperative, trolley poles may be utilized or ornamental posts designed and built locally.

In using trolley poles, ornamental casings can be secured to fit outside the poles and overcome the effect of the rake with which trolley poles are commonly set. In some cities, the street railway company will reset its poles that they may be upright, and the ornamental casing may then be eliminated, resulting in material saving. The use of trolley poles affords a great advantage in eliminating multiplicity of poles on the streets.

That the system shall consist of a continuous line of light along each side of the street is imperative, that the effect may show the street broad and open and maintain a pleasing aspect during the day.

Ornamental standards should be selected that carry the lamps in a pendant position to avoid shadows which would be thrown by supporting arms if the lamps were upright.

If we look to other cities for information, we shall find that there are in use four distinctive types of decorative street lighting:—

1. Arches or festoons over the streets.
2. The Daniels Boulevard System.
3. Posts or standards supporting clusters of tungstens.
4. Arcs hung from ornamental arms or brackets.

Arches or festoons across the street give the street a shut-in effect, are unsightly during the day, are a handicap in fire fighting and savor of the "night before Christmas."

Certain merit is claimed for the "Daniels Boulevard System," which consists of a well designed column and capital, surmounted by a 20-inch opal ball globe containing an arc lamp of great brilliancy. The light is free from shadows, well diffused and equally distributed. This is in general use in Chicago parks and boulevards. It is patented by Walter E. Daniels of the Chicago South Park Commission.

Clusters of tungstens supported by an ornamental post is the most popular method of decorative street lighting. Of 65 installations investigated, 40 were using tungsten clusters; 15, arc lamps, and ten, carbon lamps, which are no doubt replaced by tungstens.

The supporting posts vary from elaborate and expensive metal posts of special design to the use of the already existing trolley poles. Occasionally the posts are of local manufacture, the possibilities of which are shown by the one used at Mishawaka, Indiana. This post consists of a few simple and inexpensive castings and standard pipe fittings, and is very attractive.

The best installation of decorative street lighting with tungstens I have seen is at Indianapolis, Indiana, where the city streets are wide and well laid out, thus lending themselves readily to good lighting.

The system is of ornamental pressed steel posts, supporting five 100-watt tungstens, in opalescent, diffusing globes,—one upright, 16 inches in diameter; four pendant, 12 inches in diameter. The posts are 84 feet apart on each side of the street and lamps are fed from a three-wire lead cable, laid in four-inch duct located one foot from the curb and one foot under the gutter. A double-throw switch at corner posts controls an entire block and permits throwing off the four pendant lamps at midnight, while the upright lamp remains burning all night.

Arc lamps hung from ornamental arms, brackets or goose necks make an efficient and attractive installation. Among the many installations, we find various arrangements. Tall poles with goose necks supporting intensely luminous arcs,—ornamental poles supporting one, two, or three arcs from shepherd crooks,—and ornamental poles supporting two arcs from side brackets and the third hung from framework from above.

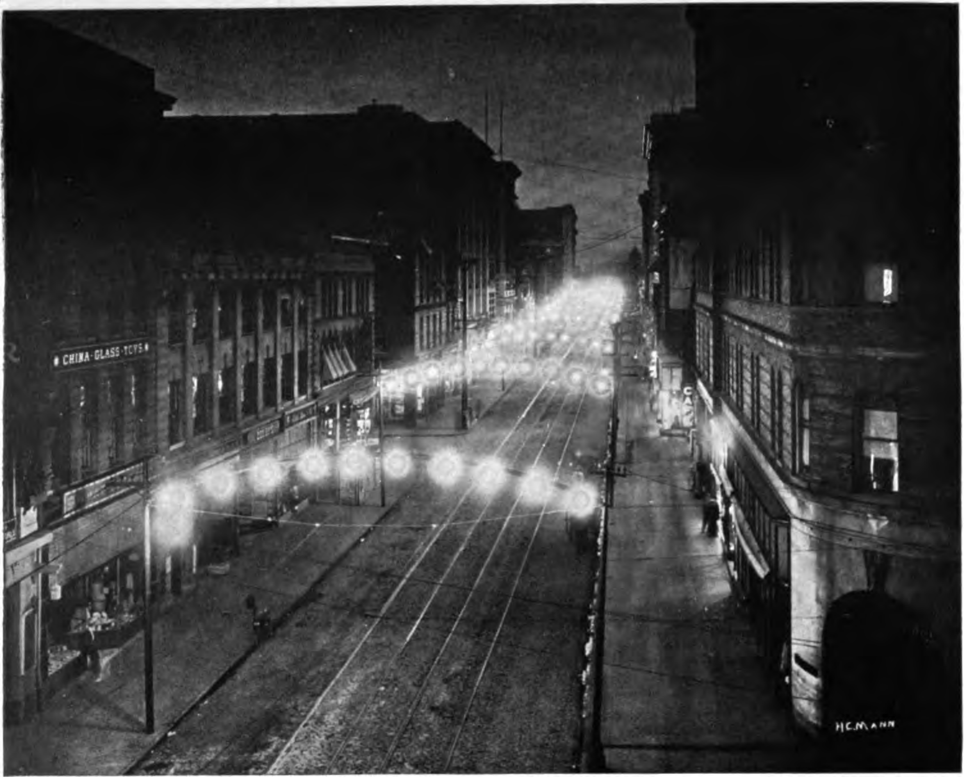
Two of the most interesting arc installations are found in Boston, Mass., and St. Louis, Missouri.

On Commonwealth Avenue 6.6 ampere Magnetite arcs are hung from attractive shepherd crooks attached to neat, wooden poles located at both edges of the green which divides the Avenue into two roadways. The spacing between lamps is irregular due to interfering trees. The lamps are 25 feet above the street and approximately 150 feet apart.

At Copley Square, four 6.8 ampere Magnetite flame arcs are supported on similar poles, 50 feet above the street and located at the points of the triangular grass plot. The lamps are approximately 200 feet apart.

This lighting is exceptionally good and pleases the citizens.

At St. Louis, Missouri, single lamp standards are used, supporting a 6.8 ampere Magnetite arc, located four at street intersections and two midway of each block, making 80-foot centres in all streets in a section of 48-square blocks,



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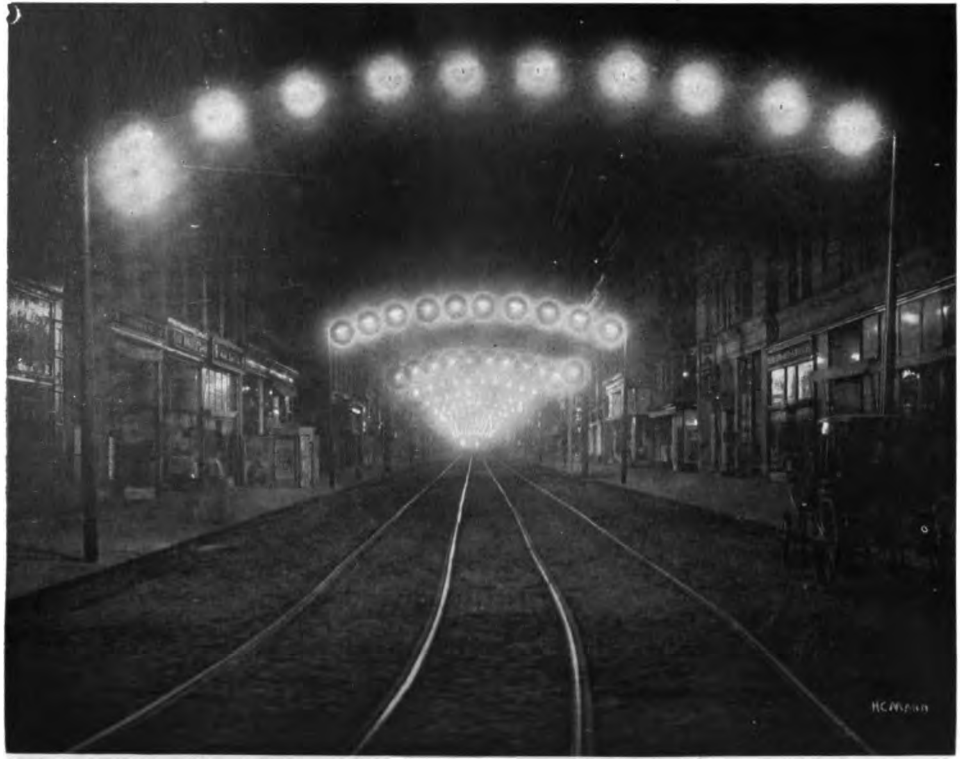

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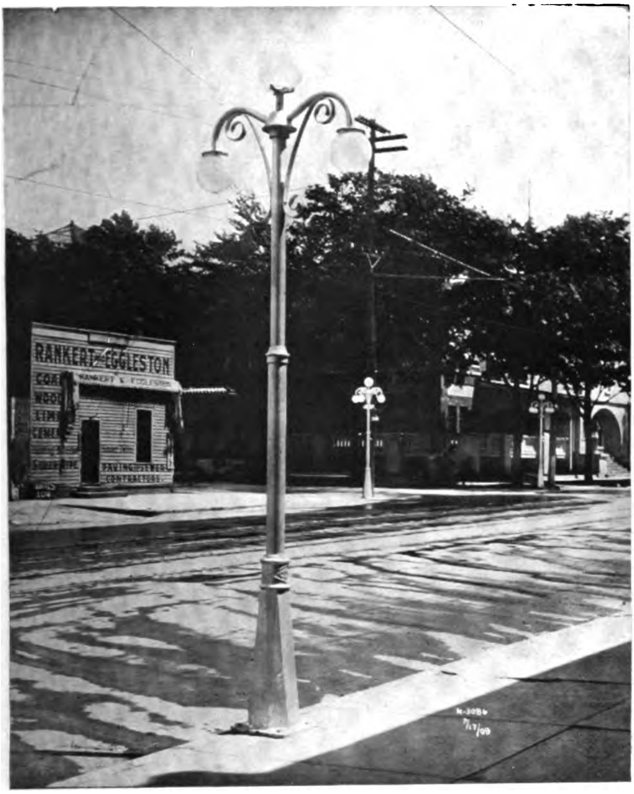
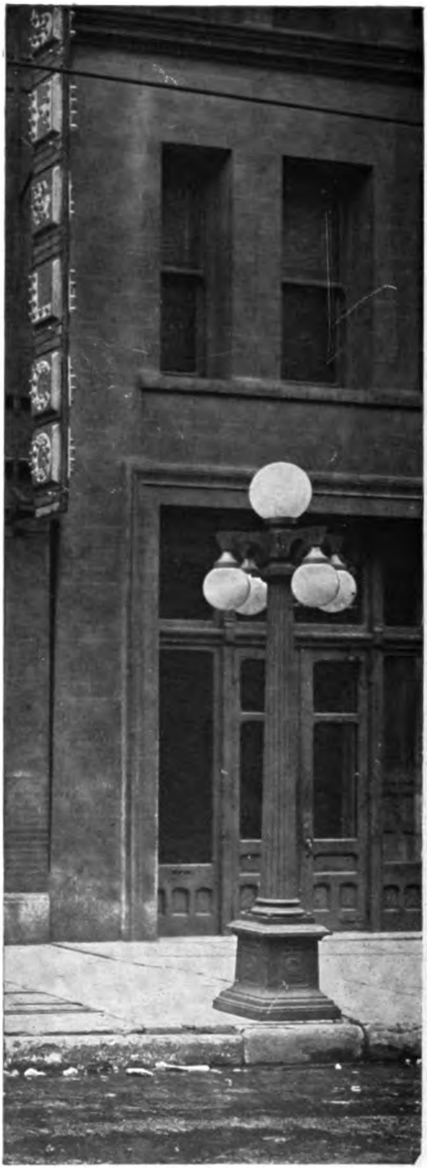
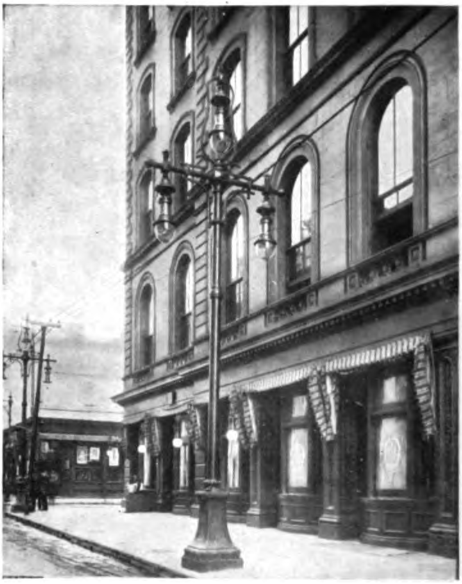


MISHAWAKA, IND.

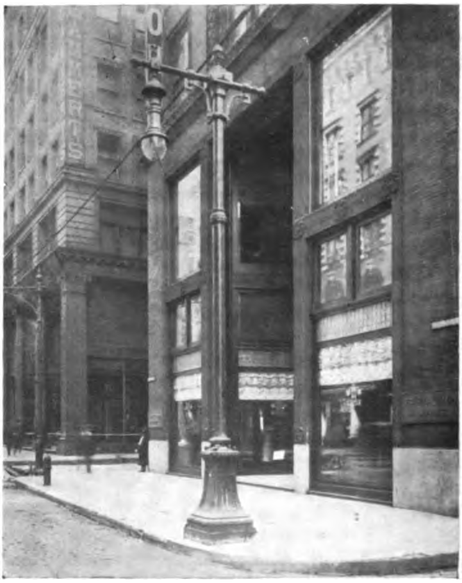


INDIANAPOLIS, IND.

INDIANAPOLIS, IND.



BROADWAY, ST. LOUIS, MO.



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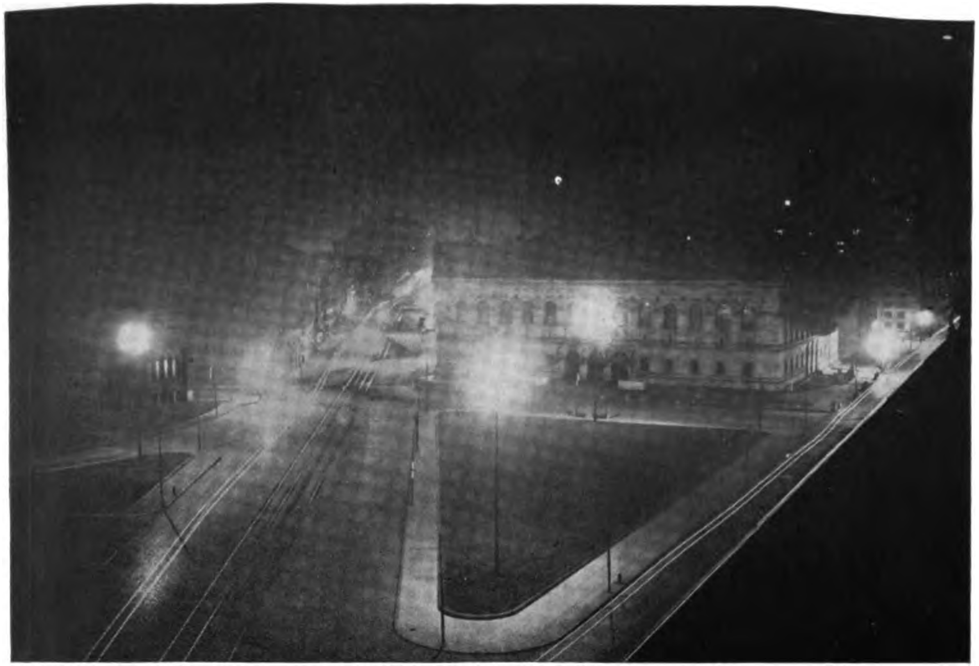

COPLEY SQUARE, BOSTON, MASS.

COMMONWEALTH AVENUE, BOSTON, MASS.

with the exception of Broadway, where the standards, carrying three four-ampere Magnetite arcs are placed opposite each other on both sides of the street, at 60-foot centres, making 30 lamps per block.

In the cities of European countries, little spectacular street lighting is attempted, but invariably the several business streets in their cities are equally as well if not better illuminated than the streets of our American cities, who boast of their special street lighting installations.

A few other New England cities in addition to Boston, Mass., have already made improvement in their street lighting. Hartford, Conn., has a completed installation of public street and park lighting. Magnetite arc lamps are used for the main streets, and 125-watt, series, tungstens on the side streets. In the parks, neat, iron, eight-foot poles are used. Each supports one 125-watt tungsten within an opalescent globe.

New London, Conn., within two years re-arranged the lighting on the main business street. More ornamental fixtures were used, and additional lamps installed, resulting in a more attractive installation and improved street illumination.

Portsmouth, N. H., has some additional street lighting Saturday evenings. This consists of a few festoons across one street.

The business streets in Pittsfield, Mass., are lighted with flame arcs which replace the regular enclosed arcs used throughout other sections of the city.

Ten illuminated arches light the main street of Manchester, N. H., two nights weekly in addition to the regular lighting.

Town and State	Style	Installation	Height	Distance Between	Design	Hours of Burning	Cost Rate	Remarks
Shawnee, Okla.	Cutler Elite st. hood brackets extending from bldgs. 5 ft. over walk.	60 w. Tung. in 10″ opal globes.		25′		Till 10:00 except Sat. when till m'night.	$5 per bracket $1.50 ea. per mo. to run.	Idea of merchants.
Roseland, Chicago, Ill.	4-lamp posts.	60 w. Tung.			Posts are white.		Elec. Co. supplies current & maintains posts.	Idea of merchants.
W.Madison Av. Chicago, Ill.	Orn. posts with 4-lamp clusters				White frosted globes.			Idea of Electric Co.
Aberdeen, S. D.	5-lamp stand. 1 centre, 4 upright on arms.	5- 60w. Tung.		4- at st. intersections, 2- midway bet.		Upright lamps till 11:00 Top all night	Posts cost $100 each.	Idea of Commercial Club.
Adrian, Mich.	Arches	15- 40w. Tung. to an arch.	28′	79′ to 115′				Steadying wire besides the regular wire.

Petoskey, Mich.	Arches	12- 5.5 amp. 220v. 60 c. p. lamps to an arch.						
Greenville, Mich.	Arches	10- 3.5 amp. 220v. 60 c. p. lamps to an arch.						
Belding, Mich.	Arches	12- 4 amp. 155 v. 32 c. p. lamps to an arch.						
Joliet, Ill.	28′ trolley pole surrounded with orn. casing with 4 arms.	4- 60w. Mult. Tungstens	12½″	70′ to 75′		Dusk to 11:00 except corner lights all night	$1.25 per ft. front per yr. for installation and current.	St. Ry. Co. pd. for pole Elec. Co. for casing City pays for service at st. corners.
Big Rapids Mich.	Arch across st.	10- 60 cp. series Tungs. 120 v. to an arch.		90′ to 100′		Average 3 hrs. per night.	$21. per yr. per 100′ linear front.	Idea of merchants who pay for the service.
Los Angeles, Cal.	Ornamental 5-lamp posts. 1 ctre. light 4 on arms.	5- 100w. Tungs.			Pedestals fluted columns, ornamental capitals. Names of sts. on cor. posts.	Top all night, others to 12	1st. yr property owners pay $1.75 per front ft. Less next year.	Idea of property owners and tenants.

Vancouver, B. C.	5-lamp standards	5- 75 c.p.		89′ to 134′		Top all night, others until 12	Prop. owners pay for installing. City for maintenance	Trans. in base of each standard, reducing e. m. f. to 11.3 volts.
Dayton, Ohio	5-lamp standards.	1- 100w. Tungs. on top. 60w. on arms.		90′		Top all night, others until 12.		
Tacoma, Wash.	Concrete stand. with large globe on top.	Series A. C. Tungstens.						"Daniels Blvd. lighting system"
Seattle, Wash.	5-light stands.	Tungstens.						
Columbia, S. C.	Steel cable stretched across st. with different length drops to get arch effect.	17- 75w. series Tungs. to an arch.	23′ lowest	105′	Enameled steel reflectors.			2 arches operated in series at 460 volts. Merchants claim more people on st. since arches were installed.

So. Denver, Colo.	Orn. steel trolley poles	Arc					Ry. *sets* poles free. City furnishes lamps. Merc. pay ½ Elec. Co. ½ cost of poles.	Idea of Bus. Men's Assn.
St. Louis, Mo. Broadway	3-Lamp Standards. 1 lamp in centre, 1 on each side arm.	211-4 Amp. 300 w. Magnetite arcs. 29- 6.8 Amp. 500 W. arcs.	Ctre. 23′ Side 18′	50′ to 70′	Cast iron pedestal, 6′ cross-arms with orn. caps "tasteful" brackets.	4 Amp. arcs to m'night 6.8 Amp. all night	Paid for by abutters, according to frontage.	Idea of City Imp. Assn.
St. Louis, Mo. "Downtown"	Single lamp, 1- arm stand.	6.8 Amp. 500 w. arcs.	18′	Staggered				
Atlantic City, N. J.	Cast iron standards; arc on top; 2-lanterns lower on posts. St. Markers.	Arc 12- 25 w. Tungstens 8- 8 c. p.	30′	95′				
Chicago, Ill.	Orn. post with suspended lamp.	7.2 Amp. series A. C. encl. arc.	14′	225′		All night		
Rio de Janeiro	Orn. posts in centre of st. 2-arms.	3- 7.5 amp. Series Arcs to ea. post.		100′	Opal inner globe, cl. outer	Top all nt. 2-side arcs till 1 A. M.		On side of st. gas lamps burn from dusk to dawn.

Denver, Colo.	Orn. casing on trolley poles. 2 arms, Orn. brackets.	1 Arc 1 Dummy 1 Arc		90′			Casing $160 Ltg. pd. by City $60. Bracket $50.	
Davenport, Ia.	16 orn. 5- lamp posts to a block	1- 60w. Tung. surmounts post. 4- suspended from brackets near top.			Frosted globe			Idea of Merc. Assn. Inst. marked by celebration (parade band concert and speeches)
Ft. Wayne, Ind.	Arches	10- 100w. mul. Tung. to an arch.		4 Arches to a blk.			1st yr. $500 per st. blk. Next yr. $300.	Idea of Merc. Municipal plant installed arches.
Omaha, Neb.	5-lamp stand. 1 upright 4 on short goosenecks.	All 60 w. Tung.						Idea of Merc.
Salt Lake City, Utah.	5-lamp stand. and 4 arms on trolley poles.							
Newark, N. J.	Orn. Posts 35 incr. to 50	1 Encl. Fl. Arc 10000 cp. (A. C.)		60′		Dusk to dawn	$270 per lamp.	Idea of merc. who pay for inst. by subscription

Poughkeepsie, N. Y.	Orn. double brack. posts	2 Arcs to a post.					
Denver, Colo.	2 Arms from trolley pole 1 over st. 1 over walk.	Encl. arc in opalescent globe. Arc over walk a dummy.					
Lake Shore Drive, Chicago, Ill.	Posts of Concrete	1 7½ Amp. Series A.C. Arc in 20" Alba globe	14′ above pavement		Very simple			
Wichita, Kan.	Orn. posts	Multiple encl. arc				Dusk to midnight.	Maintained by Merc.	On same circuit as sign lamps.
Lancaster, Pa.	Orn. suspension arms on poles	Adams Bengall regenerative fl. arcs.	20′ above pavements	70"		Dusk to 11:30 except Sun.	$480 per yr. pd. by Merc.	Idea of merc.
Appleton, Wis.	Arch in form of steel strand from buildings.	75-8c. p. carbon to each arch.	10′ at curb. 23′ middle of street.	75′		4 hrs.	$35.00 to install. Current 12c. to 5c. according to quantity.	Installation pd for by subscription. Current pd. for by Merchants Asso.
Gary, Ind.	Orn. stand. 3-lamp except corners where are 5 lamps.	1-100w. Tung. on top. 60w. on side arms.		50′	Wrought iron tapered ending in cup piece, from which wrought iron goose-necks carry arms.	Dusk to 11:00	Installed at $1.25 pr. front ft. by prop. owners. Stands. cost$70ea	City pays for current and maintenance.

Grinnell, Iowa.	Iron posts 3-lamps each.	1- 100w. Tungs. 2- 60w. Tungs.				100w. all night. 60w. until 11:00	Commercial Club pays $4.60 per post per month.	The Club is to become owners in 7 years of whole system.
Billings, Mont.	5- lamp Orn. Standards. Upright ctrs. lamp and 4 pendant from short arms.	1- 60w. Tung. 4- 40w. Tungs.				All night.	$60. per post per yr.	Elec. Company maintain globes and posts.
Minneapolis, Wis.	Cast iron columns. 1 ctre. light. 4 upright on as many side arms.	All 100w. Tungs	14'	100'	Alabaster Globes 12" on sides. 16" ctre	Sides until 12:00 Ctre. all night.	$145 ea. $78 for maintenance.	Pd. by prop. owners. Idea of Publicity Club. Lamps are bought for potential 2 v. higher than circuit. Good luck on life of lamps. Patrolmen turn off each individual post.
Niagara Falls (Park) N. Y.	Iron poles with galv. iron hood.	6- 32 cp. Carbon 120v.	14'		Simple Aluminum reflectors		State appropriates cost.	At request of Reservation Commissioners
Des Moines, Ia.	Orn. iron posts with 4 bracket arms. Lamps pendant.	5- 100w. mult. Tungs.	13'7⅜"	Some 56' others 44'	Pale opalescent globes.	Dusk to m'night	$85. cost to owners 5c. per kwh. current.	Idea of Merch. Each pole has lock switch, turned off by patrolman.

Montgomery, Alabama.	Orn. posts with 5-lamp fixtures.	100w. Tungs.				Dusk to m'night	Metered	Idea of Electric Company.
Parkersburg, W. Va.	Iron lattice-work arches.	Carbon lamps.				Satur. nights.		
Aurora, Ill.	Orn. iron poles 2- arm except on corners where 4 opalescent globes on arms.	1- 60w. Tung. in centre. 100w. Tungs. on arms.	14′	50′	Set on special curb. 8¾″ sq. at base, tapering to 7¾″ above. Then fluted for 9′ at top of which is plate for ctre. lamp.		$20.90 pd by merchants. City furnishes current & maintains.	
Oakland, Cal.	Orn. posts with centre globe & 2 on arms	3-16 in each side globe. 4-16 in upper.		6 posts to ea. block.			$85.00 installed.	Private contractor solicited this business. Merchs. pay for installing Elec. Co. for current.
Los Angeles, Cal.	Orn. iron posts. 1 ctre. globe & 4 or 5 upright on arms.	3- 8 cp. carbon lamps in each globe.		115′			$100. per pole installed	Pd. for by merchants. Faulty in that outer globe shades the centre.
Manchester, N. H.	Arch structural steel truss supported by trolley poles	68- 16 cp. carbon to arch.		300′	White enamel hood.	2 evenings per wk. dusk to 10:30.		Idea of real estate owners and merchants. First in New England.

Fort Wayne, Ind.	Arch							Idea of business men and property owners.
Grand Rapids, Mich.	Arches by means of span wires from bldg. to bldg.	14- 75w. series Tungs. to an arch.		100′				Idea of merch. Original 1800 ft. trebled. Gas Co. couldn't follow.
Columbus, Ohio	Arch	Carbon lamps.						Arch idea originated here.
Newark, Ohio	5- lamp stands. Centre. lamp upright. Those on arms pendant with Holophane Globes.	1- 100 w. Top. 4- 60 w. Sides.		108′	Finished in verde bronze		Current supplied free. City maintains lamps.	City Council the promoters
Albert Lea, Minn.	3-lamp posts. 1 ctr. light 2 on arms supported by orn. brackets	1- 40w. Tungs. in centre. 2-60 w. Tungs. pend.		88′	13″ Alabaster Globes.	Side off at m'night. Top all night.	$60. to install. $45.10 to maintain yearly.	Installation pd. by Elec. Co. Maintenance pd. by merch. who suggested installation.
Norfolk, Va.	Flat steel arches attached to trolley poles.	10-75 w. 60 c.p. Tungs. to each arch.		100′			$50. each arch. Maint. 1st yr $30 2d yr. $70 3d yr. $60	Pd. by merch. who have had arches added since installation.
San Diego, Cal.	7-lamp stands. 1 ctr. lamp. 6 on arms, upright.	32 cp. ctre. 16″ sides (carbon lamps.)		6 and 8 to a block		Dusk to m'night.	Current pd. by property owners.	Are trying 12w. series Tungs. run in multiple from trans. in post base.

Mishawaka, Ind.	3-lamp posts, except on corners where are 5.	Tungstens. 25 to 100 w.	15′	Stagg'd. Painted White.				Idea of bus. men.
Warren, Ohio.	3-lamp stand. Cross-arm running parallel to curb	80 cp. top. 40 cp. arms.	12′ & 13½′	100′		Top all night. Others to m'night.		Idea of merch. who have co-operation of lighting Co.
Indianapolis, Ind.	5-lamp standards. 1 upright in centre. 4 pendant on arms	5-100 w. Tungstens		84′	Fed from 3-wire lead cable laid in 4″ duct 1 ft. under gutter, 1′ from curb.	Dusk to m'night for pendant lamps Top, all night.	5 yr. contract, $1.05 per ft. front installation and maintenance	Idea of merchants Lights in 1 block controlled by switch in corner post.
Billings, Mont.	5-lamp orn. iron posts. 1 centre lamp, 4 pendant on arms.	1-60 w. Tungsten centre. 4-40 w. each arm.		95′		Dusk to Dawn.		
Hobart, Okla.	1¼″ iron conduit arches at street intersections	80-5 w. 12v. lamps to an arch. 1-100 w. Tung. in centre		23′ in centre.				Complaint is made that they do not give enough light.
Exchange Pl. Providence, R. I.	31′ poles Bishop's crook variety.	10 amp. 80v. Magnetite. lamps.					Cost $164.50 each.	
Waverly, N. Y.	Strung along ea. side of street.	8 cp. lamps every 4′4″	12′			Dusk to 10 P. M.	$1 per mo per store front.	Idea of the mer.

Kansas City, Mo.	Curved arm bolted to trolley pole. Lamp under reflector on end of arm.	High cp. Tungs. Also 1- 16 carbon over this.						Effect inverted.
Superior, Wis.	Ornamental 3-lamp posts. (2 side arms and 1 light on top)	14- 40w. T. on top. 100w. on arms.		55′ 16 to a block.		Top all night. Side until 12.	Posts $80.00 each.	Idea of Publicity Com. Lock switch in base of each post.
East 63d St. Chicago, Ill.	Ornamental bracket from building.	3-gl. 300 cp. Nernst Units 220v.	12′ above walk. 5′ from bldg.	40′				Used because the Elev. R. R. supports interfere with vertical posts.
Fort Dodge, Ia.	5-lamp stands. 1 ctre. 4 on arms	5- 100 w. Tungs.				Top all night; others 11:00	$1.75 per ft. front to install $7. per m. current	4-7 pd. by owner. 3-7 pd. by tenant. Idea of business men and Commercial Club, etc.
Lansing, Mich.	3 & 5-lamp pillars, the 5-lamp posts on corners	100 w. Tungs. in Multiple.	14′	about 66 ft.	Wrought iron pipe with ball fixture which supports arms & top lamp	Top all night Side to m'night.	$45. for standards excl. wiring & conduits, pd. by surpl. ltg. fund of Municipal plant	Idea of City Council.

ORNAMENTAL STREET LIGHTING.

Where Trolley Poles Are Used.

Denver, Colorado.

In one part of Denver ornamental casings are put over trolley poles, and from the casing extend two arms, one over the street and the other over the sidewalk. Arc lamps are used, the one over the sidewalk, however, being a dummy. The poles are about 90 feet apart, or four to a block. The cost of the casing is $160.

In another part of Denver there are ornamental brackets attached to the trolley poles, one to a pole, and this one extending over the street. The cost of the bracket is $50.00. Opalescent globes are used.

The City pays for the lighting at the rate of $60.00 per lamp per year.

Joliet, Ill.

In Joliet, the street railway trolley poles are surrounded with an ornamental casing, from which extend four short arms, each carrying a 60 w. tungsten multiple lamp. The poles are from 70 to 75 feet apart, and the lamps hang 12½ feet above the curb. The Electric Company pays for the cast iron casing; the property owners pay for the current in 24 monthly payments (a two years' contract having been signed) at the rate of $1.25 per foot front per year. The City pays for the service on the street corners, the lights there burning all night in the place of the overhanging arcs formerly there. The lights other than those on the street corners burn from dusk until 11:00 P. M.

Kansas City, Mo.

A curved arm bolted to a trolley pole with a high candle power tungsten with metal reflector, above which is an opalescent globe containing a 16 c. p. lamp. This installation is reported as unattractive.

So. Denver, Colorado.

In So. Denver the Railway Company sets special ornamental steel trolley poles free, the poles being paid for 2-3 by merchants and 1-3 by the Electric Company. The city furnishes the arc lamps which compose the installation. This was the idea of the Business Men's Association.

Lancaster, Pa.

In Lancaster, festoons at 65-foot intervals, each carrying 40 four c. p. lamps 18 inches apart are attached to trolley poles on each side of the street. Lights burn from dusk until 11:00 P. M. Sundays excepted. This installation was the idea of the merchants, who pay for the festoons at the rate of $13.40 each, erected.

DISCUSSION.

President Campbell. Gentlemen, we have heard a very interesting paper, and it is well illustrated, as you can see by turning the pages beyond the reading matter. The illustrations themselves, in addition to the written part, will give a great deal of information. It seems to me the paper carries the same general idea that cropped out in the discussion of sign lighting—that the electric light companies should be leaders in their communities, not only in the matter of business, but in matters artistic and æsthetic and relating to morals. We can't afford to be behind and have those things which advance the interests of our community thrust upon us. We should take the lead and offer them to the public instead. The paper is open to discussion.

Mr. Sands. It seems to me that the crux of Mr. Hunnewell's most excellent paper is to be found on page 92, in the sub-heading: "We Want Better Street Lighting. How Shall We Get It?" Why is it that so many of our western cities and towns have been able to accomplish this, which seems to most of us in New England almost impossible of accomplishment here? Possibly it may be that the wave has not yet struck us. If I remember rightly, the first installation of decorative street lighting of anything of a permanent nature was made about three years ago at Los Angeles. Possibly it is working eastward and we may expect it at any time to come our way. Another reason is that our average board of trade or merchants' association has been a rather funereal affair. I say has been. I think they are waking up. I think all through our New England cities and towns the merchants are taking more civic pride and taking steps to advance the interests of their municipalities.

Another thing is possibly the fact that changes in street lighting in the past few years have been so rapid that the average central station manager, perhaps with a little ultra-conservatism, which is characteristic of New England, has hesitated about making any radical suggestions, fearing that before his installation was complete something new and better would be offered.

Of the three types Mr. Hunnewell has discussed, the arc-lighting with luminous arcs seems least possible here in New England, except in the case of the largest cities, where it is possible to illuminate large areas and squares. Doubtless, in some of our smaller towns and cities the first step will be nothing more than a re-arrangement of our present street lighting system—getting a better arrangement and possibly more light. But that will be a step in the right direction. Of the three systems, I think myself that the ornamental posts with tungsten lamps is the system which has the most dignity and the most character. The Indianapolis system I had the privilege of seeing, but unfortunately the stores were not lighted that night. At first impression one might be inclined to think the streets were not brilliantly lighted. But on second blush, if you stopped to consider the diffusion of light, I think the results were very satisfactory, and I should imagine that when augmented by the regular window lights in the stores, the streets would be splendidly lighted.

Of course, the Indianapolis installation is the most expensive we have. The Mishawaka installation, which I am told by those who have seen it is very pleasing, is not nearly as expensive. I believe posts can be purchased for $25 per post, and I am told that the total installation in Mishawaka cost from $1.30 to $1.50 per foot front. In that instance, the merchants clubbed together and purchased and presented the installation to the city, the city maintaining the same. In Indianapolis the merchants pay $1.05 per foot front. That includes maintenance and cost of construction. That figures out something under eight cents per kilowatt hour, and when you take out cost of maintenance and interest charges on investment, it can't leave a very large return per kilowatt hour.

Here in New England the fact that we have very few underground systems militates again against some of the things we'd like to do, and I'd like to suggest that there is an opportunity here, in connection with proposed underground installations, to consider something in the way of decorative street lighting. The ornamental brackets supported on trolley poles make an installation which gives good results from the standpoint of illumination and also from the æsthetic standpoint without underground service. Lincoln, Nebraska, has installed about 250 of these. A very satisfactory five-foot, four-light bracket can be purchased for about $28. This can be mounted on trolley poles, with feeders run overhead, and the installation, it seems to me, on the whole would be a good one. I think the suggestion Mr. Hunnewell made, that it is up to the central station man first to do a little demonstrating, is one which we should a l take to heart and put in practice.

Mr. Holbrook (Lynn). I happen to be familiar with the Indianapolis situation and how that matter was worked out. It was worked out under the direction of the contract manager of the Merchants Heat & Light Company. It was taken up block by block and a prominent merchant in each block was furnished with a form of petition to the light company asking that the light company should furnish, erect and maintain so many poles and brackets containing the lamps at $1.05 per front foot per year. That is figured out, in their particular case, as paying for the ornamental fixture in three years, and gives them net five cents per kilowatt hour for their current. They succeeded in rounding up a very satisfactory amount of business and the idea has practically spread over the entire business section of Indianapolis. The contract manager left the Merchants Heat and Light Company and went to Altoona, and among the first things he did was to put out two ornamental poles in front of the electric light office and began a small agitation in favor of that method of street illumination. He figured that in Altoona he would be obliged to get $1.44 per year per front foot, or 12 cents per front foot per month on a five-year contract, and that at the increased price of poles over the Indianapolis poles the fixtures would be paid for in three years and the light company would get five cents net for its current. About two weeks ago I was informed by Mr. Ferdette that he had succeeded in getting five blocks on that contract, that a number of other blocks were under way and that a number of applications had been received from prominent merchants in other blocks for installations. The matter seems to be widespread.

MR. DAWES (Pawtucket). The subject of street illumination interests me because I am a westerner myself and have only been in New England for the past month and a half. It seems to me that where decorative street lighting is used to any great extent in western cities, you find a lack of signs. It also seems to me it is a question whether you want electric sign business or decorative street illumination. The little cities in the West of from 30,000 to 50,000 that have ornamental street lighting are not progressing well as far as electric signs are concerned. Rockford, Ill., the little town Mr. Blood spoke to us about this morning in his talk on electric vehicles. I wish to state I was connected with the Rockford company about a year and a half. They claim to have more electric vehicles per capita in Rockford than in any town of its size in the United States. They have also about 200 electric signs—the streets are literally plastered, so to speak, with electric signs. The question of street lighting was put up to the Rockford Electric Company time and time again in the past two years, but it was held off because they were afraid it would interfere with their sign business. But I understand they are taking up at present the subject of putting in ornamental posts for street lighting. They can well afford to do it now, because the town is simply ablaze with electric signs.

In his paper Mr. Hunnewell states, if I am not mistaken, that the city should carry the lighting on their own shoulders. If that can be accomplished I think it would be a great deal better, because if the merchant has to pay the $1.50 per front foot for that street lighting, there is very little chance of getting him to put up electric signs, because that is absolutely all he will carry. I am speaking from a salesman's standpoint, because I have spent eight years in the field soliciting new business up to within four or five months. I would like to hear a little discussion on the subject, to find out whether or not it is thought the street lighting would affect the sign business.

MR. HAYES (Fitchburg). In connection with the point just raised, I will take but a moment to give the situation in Fitchburg, Mass. The merchants of the city had an idea the street illumination was not what it ought to be. They came to the lighting company for a proposition for concessions of some sort that would benefit the street lighting. A committee was apointed to confer with the company and we finally got down to brass tacks and the whole matter was carefully gone over. It appeared from the discussion that the store windows perhaps had a very important bearing upon the street illumination. The matter was settled, for the present, at least, by making a proposition to the merchants that would tend to give uniformity to the use of show windows, and a campaign was started to inaugurate show window lighting first of all. As a part of the whole scheme it was expected that after the show window business was developed, we could then more readily get the sign business. After the show window lighting has been developed, the merchant's mind, I believe, in the natural course of things, will turn to sign lighting to a reasonable extent. After that, if there is then a demand for more illumination, why I think the mind of the merchants can well be turned toward additional street lighting. In any case, I must say the appearance of the streets is certainly very greatly improved by the results of a systematic canvass for show window lighting. I think where it has been impossible to obtain the business, or where there are no stores, it certainly shows up to the city authorities the necessity of additional street lighting in these sections not receiving light from the store fronts. Thus, show window lighting raises the standard of street illumination.

Mr. Bryant. There is a movement spreading through the western and central parts of the country and also through New York state for flame arc lamp lighting. There are pros and cons to that, as to whether or not it is a good thing for central station men. The merchants in many towns seem to want it. For smaller towns it might work out very favorably and might not. That is a question I'd like to see taken up here.

Mr. Lisle (Providence). We have that same demand in Providence. It was started by the lighting of Copley Square, Boston. We wanted to meet it, and yet did not want to re-arrange our whole system. We still maintain the old 10 ampere open arc lamps. The city demanded something a little better and to eliminate rewiring until after the expiration of our contract, we had made some 10 ampere magnetite arc lamps, which do the same work as the flame arc lamps in Boston, and although the current consumption is very high, as a temporary make-shift it helps us out considerably and the illumination is very good indeed. I suggest this so that any members who have the same problem may have the benefit of it. They can be put in on the same circuit with open lamps, reducing the number of lamps per circuit somewhat, and thus tide them over until they are ready to install a complete new system.

President Campbell. Necessity is the mother of invention. Has any other member found himself in difficulty and forced to find a way out? I would like to have more discussion, especially on the phase of the question as to whether the merchant can afford to pay only so much, and whether he will choose between paying for window lighting or outside street lighting. That seems to be a very interesting point and well worth further discussion.

Mr. Sands. I'd like to touch a moment on the question raised by the gentleman from Pawtucket. Is it possible to have special decorative street lighting without curtailing the sign business? What do we care? It is current we are selling, and in the long run the load factor with decorative street lighting will be very much better than with the sign business.

Mr. Lisle. In connection with the same point, when the standard of illumination in the streets is raised, isn't that going to raise the standard of window lighting? And has anyone had any experience where an ornamental system of street lighting has been put in and window lighting has been curtailed in consequence?

Mr. Dawes. The cities in the West that are illuminated with ornamental street lighting have not the number of signs that are found in towns that have not the street lighting. That is a positive fact. Take Aurora, Ill., for instance. The sign business of Aurora, Ill., is not within 75 per cent. of that of Rockford, Ill. It seems to me that once the street lighting comes in the sign business is dead, absolutely. That is, of course, where the merchant has to pay for the lighting. But if you can get the city to carry the expense of the lighting, that is a different thing. But out there, as a general rule, the merchant pays for it. I think, Mr. chairman, it might be well to call on representatives of different lighting companies and get their views on the subject. I think it is of vital importance. We have the question up in Woonsocket about street lighting at the present time. One gentleman remarks here that we don't care whether we get sign business or not. I don't think the street lighting brings as much revenue as the sign business, especially if the signs are on a flat rate from dusk until 11 or 12 o'clock P. M.

Mr. Sands. In answer to Mr. Lisle's question, I would say that in the last issue of the "Electrical World" is an article on decorative street lighting, in which the statement is made that the experience in Indianapolis had been that the installation of ornamental posts had led the merchants to spruce up on window lighting, resulting in an increased business in that direction.

Mr. Holbrook (Lynn). I wish to corroborate absolutely Mr. Sands' statement that neither the signs nor the windows in Indianapolis have suffered by the introduction of ornamental poles. In fact, the business has been largely increased by the use of that system.

Mr. Frank B. Rae, Jr. (New York). On the other hand, in St. Louis the extremely bright lighting, especially on Broadway, has practically knocked out all of the window lighting on the street and most of the signs. I think those who were at the St. Louis convention noticed the same thing. The attitude of the merchants, as I learn from the local central station commercial men, is that the street lamps gave them enough light for their windows and they weren't going to pay for any more.

Mr. Rowell (Plymouth, Mass.) It seems to me that those who saw the lighting on Broadway, St. Louis, will agree that that is an extreme case. The thing was entirely overdone, and it is no wonder to me that the merchants let up on their window lighting and did away to some extent with their sign lighting. In the other case the gentleman speaks of it is the other way. There is such a thing as overdoing in lighting the same as in anything else. That is something we want to look out for. A gentleman over here speaks of having town or city pay for extra street lighting. I think that is a hard thing to do in most cases, from the fact that it is distributed through the farming districts. Some of us come from farming sections of the country. We can't get the farmers to pay for extra street lighting on our main streets. I have been trying for two or three years to get one of the towns we serve to take up the matter of street lighting at all. They don't have any street lighting whatever. And one of the difficulties is that the business section and the farming section are evenly divided, and the farmers refuse to pay for lighting the streets where the merchants are.

Mr. Rollins (Hartford). It is becoming a practice more or less of the authorities in our eastern cities to employ an engineer to lay out street lighting. At least, that was our experience in Hartford, and it was laid out regardless of all private lighting. If there was an electric sign or a well illuminated corner, the street lighting was placed there just the same, regardless of private illumination.

Mr. Lisle (Providence). There is one suggestion that might be of value to the members. We found in the country towns, where we have the alternating current and enclosed arc lamps, that we could substitute series tungsten incandescents for the arc lamps and get just as much income, at the same time give the public a more satisfactory distribution, also improving the power factor of our system.

Mr. E. J. Richards (Gardner, Mass.) In Gardner, Mass., we have had similar complaints.

During the past three or four months we have replaced about 30 arc lamps with 60 watt tungstens and the change has proved beneficial to the company and has given better street illumination with consequent greater satisfaction on the part of the public.

In one of the public squares we recently tried the experiment of installing a couple of flaming arc lamps on our series street lighting circuit, and as it has been favorably commented on by the press and public, I think all the squares in the city will be lighted that way.

President Campbell. In connection with the lighting of country districts, I would like to ask Mr. Lewis if he is not doing something in that line.

Operating in Rockville, Stafford and Willimantic, Conn., we have a number of country districts—small settlements of six to eight hundred inhabitants—which we have very recently connected to our service and lighted the streets with multiple and series tungsten lamps.

One place I now recall—So. Coventry, about three miles from Willimantic—we installed 40 60-watt tungsten series lamps operating them every night until midnight; this system is controlled by a 2300-volt time switch and has given absolutely no trouble; the lamp outages have been satisfactory so far, but the system has only been in use about three months. There was no street lighting here prior to the time we ran a 23,000-volt line through the district, which supplies two other stations.

In another place—Stafford Springs—we have a number of 100-watt tungsten lamps operated with a time switch, connected to our multiple 110-volt commercial circuits; also a number of 40-watt tungsten lamps operated from our series, 1¾-ampere street lighting circuits. On Main street, this district, we lighted with 6.6-ampere arc lamps and replaced these experimentally with 100-watt multiple tungsten lamps, allowing three tungsten lamps for each arc; we thought the street was better lighted with the tungstens but the lighting committee stated the arc lamps gave more of a city appearance to the town and therefore ordered the arcs replaced; we installed six-ampere multiple 110-volt lamps and the authorities advise they are now getting better light than before. These lamps operate on an every night midnight service. When they referred to "city appearance" they stated Hartford, but I noticed recently Hartford has changed over their East Hartford district to tungsten lamps—size I do not know—replacing a number of arc lamps and it seems to be a decided advantage to the traveler in going through fast (it is a good place to go through fast)—Laughter.

Another district—Ellington and Crystal Lake (near Rockville)—we have 40 40-watt 110-volt multiple tungsten lamps operated from our commercial circuits on time switches. These lamps have been subjected to all sorts of conditions but we have had little trouble with this service. This is also on the every night midnight service.

The radical wave reflectors are used on all these lamps and the entire outfit makes a neat appearance. The lamps are General Electric, Franklin and Westinghouse.

With the tungsten lamp, many of the country districts can be taken on, especially on the midnight service.

Mr. Schwabe (Windsor Locks, Conn.) About April of this year our street lighting contract in Thompsonville ran out. The installation consisted of 26 6.6-ampere enclosed AC arc lamps, and 100 25-CP carbon lamps in the same circuit.

The territory is pretty well built up in the commercial section, the store section, and there is also a very large rural territory. I took up the matter of changing this over to tungsten lighting system, principally for the reason that we were getting a pretty good price for the arc lamps, and felt that we would have to reduce the rate, which would cut down our revenue. The feeling mentioned by Mr. Lewis also prevailed here. The merchants thought the town would lose the city effect by the removal of the arc lamps, and it was a very hard feeling to overcome with some of them. However, as an example, we removed four of the arc lamps on the principal street, from the railway station up, which happened to be a very favorable one for this demonstration, because of the fact that the street is built up on both sides with brick buildings. These four arc lamps were replaced by 16 60-candle power tungsten lamps, and the effect was very good. The street is not very wide, and the brick buildings on both sides give it the effect of a wide alley, and these 16 tungsten lamps on these two blocks illuminated every inch of the way. That removed the prejudice against the removal of the arc lamps, and we changed over to 110 60-C. P. and 100 25-C. P. mazda lamps. The town is governed by three selectmen, two of whom are from the rural territory, and by this change-over the town gained enough lamps to light up a good many other dark spots and dark streets that before had no lighting at all. From our standpoint the change was very satisfactory, also, increasing our gross from the street lighting there about nine per cent. In addition to that, we have lowered the energy supply for this system by nearly 30 per cent.

Mr. Addis (Brattleboro, Vt.) I have been waiting quite anxiously to hear from some of our smaller brothers, being a representative of a small company myself, and feel we are just beginning to get mixed up with the larger companies in the discussion. It has been my pleasure, perhaps, as well as my misfortune to be out of the New England district for the past 15 or 16 years. I am a native of Connecticut, but have only been back in my own for about a year and a half, feeling something like a stranger in a strange land after my long absence.

Our conditions in Brattleboro are now about to undergo a change. Our street lighting contract has expired, and we are somewhat at sea as to what position to take with regard to advising our town officials what system of street lighting to adopt. I am inclined to agree with some of the gentlemen here who have brought the question up that possibly decorative street lighting will interfere with sign lighting and perhaps show window lighting. I am now, perhaps, speaking from an outsider's standpoint. But having been so long absent from New England, the New England traits are brought before me perhaps more vividly than they appear to those who have been here for a number of years. I find, while you have been making comparisons with the western cities—the larger western cities—that they do not come to the point in covering the situation of our small New England towns. We find that the average westerner, as was stated in the very ably written article on "Decorative Street Lighting," makes money by spending money. I have observed, also, that the New England merchant makes a good deal of money by saving money. If you go to the merchant and ask him to go down into his pocket for $1.50 per foot front for decorative street lighting, I am afraid from my experience during the past year, he will try to hedge that $1.50 foot front on his inside lighting.

For instance, the New York City man, the merchant in the large city, probably said to himself when you went to him with the tungsten lamp proposition: "I have been absolutely satisfied with what I have paid for my light"—$25, $50, $75 or $100 per month, as the case might be—"but I have not been satisfied with the amount of light I have received. The lighting company's representative offers me now twice the amount of light for the same amount of money. I am thankful. I will use the same amount of energy, spend the same amount of money and get twice the amount of light."

But go up into the hills of New Hampshire, Vermont or Maine, and put that proposition up to the merchants there. What would they say? "This looks like ready money to me. I can save 50 per cent. of my electric light bills"—which they proceed to do. We don't find them anxious to pay $15 or $20 a month when they can get the same amount of light for even half that amount. So, I am afraid, gentlemen, I should be a little bit lax about recommending that the merchant be asked to go down in his pocket to help pay for decorative street lighting. I should prefer to see that adopted by the legislative authorities.

MR. A. F. TOWNSEND (Woonsocket). We operate in the town of Franklin, Mass., having a five-year contract. There was a provision in that contract giving the town the privilege in a two-year period of changing to the incandescent lamp. We had about 40 arc lamps installed. The town voted at the end of that period to take out all of the arc lamps but twelve, leaving them at railway crossings and in the public squares. The provision was to substitute five tungsten lamps for each arc light, and the company was to pay for the change inside of the existing street lighting lines, and the town was to pay outside. We have that work practically completed and the results have been very gratifying. The people like the change and we have tried to get out the remaining 12 arc lights. In order to do that we put in a five-light tungsten cluster in place of one of the arc lights, and a 200-watt single unit in place of another, making them the proposition that we would replace the arc with five-light tungsten cluster, or give them a single unit and give them two additional lights anywhere within the existing lines at our expense. The majority of the people, I think, are in favor of that, but they are to have a special town meeting next Monday to decide that. We feel all of the arc lamps will come out. There are a lot of shade trees in the town, and the incandescent lamps, distributed as they are, give better results.

MR. BLOOD (Boston). It seems that these questions of sign lighting and decorative street lighting verge closely one upon the other. You will probably put me down as a heretic when I say that I do not believe in sign lighting at all. It is perhaps a necessary evil. It is here and we must make the best of it. A good many companies need it to make business profitable. But I look on it as a passing business. It won't last long. It is objectionable. The public as a whole don't like it. Very few of the electric signs I have ever seen have any merit whatever. They are, I admit, good current consuming devices. But mark my words, ten years from now there will be very little of this sign business done. The agitation against billboards throughout the country is along the same line. Billboards in certain sections are things of the past. In the little town in which I live, a suburb of Boston, we had many billboards. A crusade was started against billboards, and now we have no billboards, except two, which are still under contract, and I expect that within six months those two will be down.

As I have said, the public as a whole don't like them and the public as a whole generally have their way. In making a study of the distribution of street lights in various cities not long since, I found the greatest variation in the amount of energy used per square foot of street. In the number of companies investigated, the variation amounted to more than 500 per cent. If some of you gentlemen will spend the same energy in increasing the illumination of your streets, either by decorative means or an increased number or size of units you'd not only get larger returns than you now do from sign lighting, but you'd get an improved load factor, and I believe an improved load factor is one of the most important things for the central station to look after. I, personally, shall welcome the day when the electric signs are kept off the streets.

President Campbell. Mr. Blood has given us food for thought. The discussion has taken a very interesting turn. But we have an equally interesting paper to hear, and I am afraid we cannot continue this discussion without injustice to Mr. Chase.

Mr. Chase (Concord). I am perfectly willing, Mr. President, that this discussion should go on. I'd like to line up with the heretics, because I come from a community that is against electric signs. They have just forbidden us to put a side across the sidewalk, and I have intimations that if we follow up our sign program, or if we try to, there will be influences brought to bear upon the city fathers to put a stop to it.

President Campbell. This is becoming very interesting and the chair feels some hesitation in bringing the discussion to a close. On the other hand, I feel that we are doing it at the right time. The point has been strongly made and emphasized again that we must consider something besides revenue and take an interest in civic improvement, and I do not believe we could continue the discussion and stop it at a point that would leave a better closing than the present one. If there is no objection, we will stop the discussion now and take up the next paper, which is by Mr. Levin J. Chase of Concord on "Opportunities."

Mr. Chase. It seems to me fitting that I should preface my paper with something in the nature of an apology. When your committee drafted me to write this paper I protested on the ground that my appearance before you as an authority on any phase of our business would be an unpardonable presumption. But they laughed at my timidity, so here I am. In the words of the Roman gladiator, "We who are about to die, salute you!" I want to make it very clear to you that I do not appear here as an authority, but as a student, and I, furthermore, wish to acknowledge that any success I may have achieved in my own little cycle is due very largely to the kindness, charity and splendid fellowship I have received from my associates in the New England Section. I want to distinctly disavow that I am here in the position of the little boy who was trying to teach his grandmother how to suck eggs, or like the little boy whose teacher caught him drawing a picture in school. She said, "Johnny, what are you doing?" He said, "I am drawing a picture of God." She said, "Why, you shouldn't do that. Nobody knows what God looks like." "Well," he said, "they will when I get this picture done."

OPPORTUNITIES

By Levin J. Chase,

Manager Concord (N. H.) Electric Company.

The title of this paper was given to me by a member of our Association, who suggested that I write a brief account of my efforts, as a non-technical and newly created manager, to remove the natural prejudice which the public is prone to cherish for a corporation engaged in public service. I call it a natural prejudice because the present generation seems to have been born with a distrust for corporations that serve the public and because it is plain that there are excellent reasons why lighting companies and the like should be regarded with suspicion. Although we have formally renounced the devil and all his works we are still under a cloud and are continually reminded of the eternal verity that the evil that men do lives after them.

Many of us are able to hark back to the era when public service corporations were held in universal detestation. In the days of my childhood my father, who was a just man and slow to anger, was wont to wax eloquent over the iniquities of the Philadelphia Gas Co. The arrival of the quarterly gas bill was the signal for parental wrath and the periodical visits of a red-faced meter reader were regarded as events that boded inevitable evil to the home.

Such was the attitude of the public in those days and the conditions persisted until a very few years ago when the people rose in their might and demanded relief which was partially obtained in the form of ignorant, restrictive and oftentimes destructive legislation.

It is my purpose in this paper to consider the ways and means of purging ourselves of this hereditary taint which clings to us like the shirt of Nessus. Do we, bound down as we are by rules, precedents, systems and traditions, many of which were created to meet conditions that no longer exist, do we, so hampered, make the most of our opportunities to win the good will and confidence of the general public? Have we not, because our product is intangible and conceived in mystery, held ourselves a little apart from the common herd of commercial enterprises? We manufacture a product which we know is good, a product which we believe to be one of the mainsprings of modern progress and we should be able to sell it as easily as we would a pound of sugar or a yard of cloth. To be sure we have obscured our business with technical terminology which is but dimly understood by the public. Following up this policy the Lamp Association has decided to rate lamps by watts instead of candles, which will remove the only term that was clearly understood by the average consumer. The meter is not as intelligible as the scales or the yard-stick and the kilowatt hour is not as lucid as pounds or feet but in spite of such difficulties, which time may modify, there seems to be no good reason why the average citizen should not entertain for his lighting company the same confidence and esteem that he has for his grocer or physician.

I approach this subject with considerable trepidation and a vague sense of my inability to enrich our deliberations with original thought or practical suggestion. I have no doubt that many of you have pondered over the problem of public distrust and solved it to your entire satisfaction. I am afraid that I would have declined the task so kindly imposed upon me by your committee had it not been for the fact that less than twenty-one months ago I was connected with a large trans-continental express company, with an unbroken service record of twenty years. Twenty-one months ago I had no more idea of going into the Electric Light business than I had of studying theology. Moreover, I have been a manager less than eleven months and although it seems unbecoming for me to preen my pin feathers in an assemblage of men of ripe experience it is just possible that the story of a manager who approached the problems of his position from the view-point of a layman, unhampered by technical knowledge or the customs and traditions of the central station, may be interesting if not instructive.

I come from a semi-rural community and it is quite likely that you will regard mine as a voice crying in the wilderness. If such proves to be the case I shall console myself with the thought that Moses was found in the bulrushes and it was left to him to guide his people out of the darkness of Egypt.

If, in the course of this paper, I make frequent use of the personal pronoun let it not be regarded as a sign of an exaggerated ego for it should be borne in mind that my convictions are based entirely upon my own experience in my own restricted sphere of action. I was thrown largely upon my own resources with but a vague knowledge of the duties pertaining to the position. It is impossible to measure the success of my methods, as I have scarcely made a beginning, but it is fair to say that during the past eleven months there has been no popular uprising against our company, the natural increase of business has not been discouraged and I have reason to believe that, at this moment, the generators are still intoning the long drawn kilowatt chorus. In other words, with friendly assistance from above and below, I embraced some of my opportunities.

I awoke one morning, less than a year ago, and found myself the manager of an electric company in a city of 20,000 inhabitants. It is a city of homes and noted for its ultra-conservatism. I knew almost nothing about the operation of an electric plant and was a stranger to at least 50 per cent. of our customers. So far as I could see the only qualification for the position that I possessed was the singular confidence of my employers. For several weeks I groped in the darkness and during that period my condition was much like that of the porcupine who suffered from in-growing quills.

I found the plant in first-class physical condition and the organization was composed of men of high character who had been selected and assigned with excellent judgment. My predecessor was an accomplished engineer and the fine condition of the plant was due to his skill and intelligent foresight. But our relations with our customers and the public generally were not satisfactory. We had a few good friends, a few influential and implacable enemies and the rest maintained an attitude of dignified neutrality. The latter seemed to take the ground that the worst thing that could be said against us was that there was nothing in particular to be said for us. In other words our virtues were negative rather than positive. Our service was good and furnished at a fair rate and the customers who came to the office were treated with mechanical courtesy. But no rule was suspended in an effort to please, no traditions were violated and the standards of action set up years before were rigidly maintained. Customers and prospective customers were sometimes sent away in rage or disgust if their wants conflicted in the smallest way with the system. The idea of losing a dollar to get two back was regarded as the pernicious dream of a non-technical enthusiast. A rule forbidding the free-renewal of defective Tungsten lamps was enforced to the letter. I recall overhearing a clerk in the office, who by the way, is no longer with us, disputing with an elderly merchant, the best friend we had in Concord, over the free renewal of a Tungsten lamp which he honestly believed was defective.

Such in brief was the condition that confronted me at the commencement of my career. At that time I indulged in long periods of doubt and anxiety which I carefully concealed. I was searching for opportunities to win the esteem of the public without breaking rules and upsetting traditions. I thought of all the successful business men that I had ever known and tried to remember their methods. Among the many men and methods that came to mind I recalled an obscure grocer who does nine-tenths of the business in his town because his relations with his customers are such that they would be ashamed to trade elsewhere. He is energetic, obliging and helpful. He charges standard prices for his goods but for the little courtesies and lifts, that mean so much, he has no charge. It seemed to me that the grocer had the best of us.

I finally realized that if we were going to advance the company in public esteem it would be necessary to forget the system for a while and proceed on radically different lines. I had felt all along that a public service corporation which enjoys a monopoly is under especial obligations not only to provide a satisfactory service but to maintain a broad minded and liberal public policy, consequently, I made up my mind to line up the company with the progressive element of the community and make it one of the leaders in all movements in the direction of civic progress and improvement. I took the ground that if we were to acquire a reputation for public spirit we should not wait to be drafted into such movements but volunteer, thus making a virtue of what would probably be a necessity.

The "satisfied customer" and the "square deal" are hackneyed phrases for which I would substitute the "grateful customer" and a "good hand for all." I have endeavored to impress upon my associates that a square deal involves a large percentage of poor hands and that we cannot afford to give any customer a bad hand.

Very early in my career I found that a prolific source of dissatisfaction was the large number of trivial charges that were made for trivial services. If we helped a customer out of a little trouble with his lights he was charged with the man's time from the moment he left the shop. These charges produced very little revenue and an endless amount of irritation and they are not made now without the manager's approval.

My first serious task was impressing upon the organization my personal idea of our proper relation to the public. I tried to teach them the value of an unexpected courtesy and the unadulterated poison in the cant expression that "Offered services are unwelcome." I persistently taught the time-worn doctrine that the success of a business depends largely upon the personality of the employees. I pointed out the necessity for patience, courtesy and dignity in their relations with each other and the public. I called attention to the well-known fact that many customers know the company solely through the meter readers and that they should be careful to faithfully represent its aims and policies. I insisted that a customer with a grievance should be treated as if his trouble was real until it was proved otherwise. I told them that a customer in trouble was a fine business opportunity and to make the most of it. I was frequently met with the objection, "If we do that for one we will have to do it for everybody," to which my invariable reply was, "Well, do it for everybody and do it as if you were mighty glad of the opportunity."

I spent a great deal of time trying to fix upon the best method to pacify customers with an ancient grudge and finally came to the conclusion that it could not be done by sitting in the office and giving them absent treatment. The more we think of such matters the worse off we are. According to the dictum of Dr. Samuel Johnson, the man who stands irresolute in a cold room trying to decide which leg he will put into his trousers first is likely to catch cold. Do something, do it graciously and do it at an *opportune moment*. The stale slogan "Do it at once," is the product of a mind that should be devoted to the instruction of parrots.

Not long ago it became the duty of one of our men to pacify an indignant customer and he asked me whether he had better go in person, write, or have me go and I told him that he reminded me of the story of the man who received a telegram from a distant town announcing the death of his mother-in-law. The message wound up with the question, "Shall we embalm, cremate or bury?" Whereupon the man telegraphed back "All three—take no chances."

It should always be borne in mind that a disgruntled customer or a down-right enemy furnishes fine business opportunities. If it is an old grudge, so much the better because a convert is always more radical than the one who stays put. In our business, as in politics, the insurgent whose wounds have been dressed becomes a good citizen and an agreeable companion.

When I looked over my field I found that one of our largest customers was our most active and vindictive enemy. His appearance at the office was always the signal for thunder, lightning and oral fireworks and I decided to call upon him and have it out. I was warned to keep away from him, but persisted in my purpose. One of the advantages of being non-technical is that you don't know a live-wire when you see one. I was ushered into his presence and if he was glad to see me he concealed his pleasure with entire success. After an attempt on my part to break the ice he asked me what I wanted and I told him that it was my purpose to find out what he wanted. You may be interested to know that after a somewhat spirited conversation I unburied the instructive fact that the sole reason for this old grudge was an uncivil answer that he had received from one of our employees over the telephone. His material wants were few as he was perfectly satisfied with the service but he was offended by our attitude of indifference. Today that man is one of the most active friends that we possess and all that his good-will cost was a few hundred feet of copper, which is rapidly paying for itself and some Tungsten Lamps to which he was clearly entitled.

That is a typical case and other wrinkled fronts were smoothed out in much the same way. An intelligent and friendly interest in their welfare will win the confidence of nine business men out of ten.

The prevalent habit of treating all customers alike is in my opinion a grave mistake. I don't mean that there should be illegal discrimination or favoritism but there should be a careful and intelligent discrimination of attitude. The trickster with a grievance and the reputable citizen with the same trouble are two entirely different matters and should be so handled. The manager in particular should qualify himself to meet all sorts and conditions of people from the highest to the lowest on their own ground and as far as possible familiarize himself with the character of each. If he possesses sufficient technical knowledge to meet ordinary emergencies so much the better. Treat every caller so that he will call again and don't feel that you must talk shop. The colloquial prattle of the salesman does not appeal to everybody and right here, a legal discrimination may be wisely practiced. If, however, our conversation must be in accordance with the standards of the barber-shop, much time and trouble will be saved if we embody our thoughts in a series of rubber stamps. Many managers are so engrossed in technical abstractions that they have no time to devote to the leisurely customer but it seems to me that in confining themselves to the study of voltages, phases and frequencies they are neglecting golden opportunities to strengthen themselves with the public.

The opportunity given to every manager to visit at regular intervals all large consumers I found of especial value in various ways. By no other method can the manager become acquainted with the customer who either will not or cannot come to him and in no other way can he so completely ascertain his needs. He may not need anything but he appreciates the spirit in which such a call is made.

The manager should not fail to take advantage of the opportunity to cultivate cordial relations with the newspapers in his town. The good-will of the press is an asset that can scarcely be over-estimated as it means each year a large amount of free and effective advertising. By use of a little discretion and a judicious suppression of self, the activities of the company can be fully and inexpensively kept before the public.

The opportunity to maintain friendly relations with city officials should not be neglected. In Concord the Chief of the Fire Department has recently become an honorary member of our Social Club and there is a continual exchange of good offices between the Company and the other City officials, more particularly the Street Commissioner and City Marshal.

The opportunities for a manager to ingratiate the company with the public, through the medium of his organization, are so many that it is impossible for me to cover them in this paper even in the briefest way. The organization is the "bus-bar" of the company that distributes either confidence or distrust into the remotest corners of his territory. Unless the employees from the humblest to the highest reflect in their conduct the policy of the company the best results can never be attained. This is particularly true now that central stations are beginning to realize the importance of residence lighting, a branch of the service which takes them into the inner precincts of the home.

Let me point out one more opportunity for a manager to strengthen his company in public esteem and then I must close. Maintain rigidly the dignity of your position and the company. Nothing is gained by meekly and weakly submitting to insults and unjust abuse. There are times when the possession of a spine is an asset rather than a liability. When a customer threatens to terminate the service, giving no opportunity for courteous explanation, I always meet him half way and unless he recedes from his position, the meter is out before he gets home. In pursuing that policy during the past year we have lost just one meter which, by the way, is not likely to be restored.

I would like to say a few words about the man—the man we employ to do our work. Methods of handling men have changed radically during the last quarter of a century and the day has gone when we can get the best out of good men by harsh measures. It was said of the Roman soldier that he was more afraid of his officers than he was of the enemy and that policy carried with it the seeds of its own destruction. In the long run cold-blood does not pay as a settled business policy and the autocrat is rapidly giving way to men of kindly instincts and broad humanity. And yet, even in this enlightened era, there is a man, an officer of a rich corporation, who rules a large body of men by terror and falsehood, a man who derides the sick and scoffs at the unfortunate, who filches ideas from his subordinates and calls them his own and who employs abuse as the divine instrument of government. It is well known that this man's policy has cost his company thousands of dollars because his subordinates hate him, and hate is an acid that destroys the moral fibre of the flesh it feeds on. I cite this instance merely to show that the man who works for a harsh and vulgar master works like a convict, without hope, energy or ambition.

There should be a feeling of mutual confidence between the man and his employer and the duty of building up that feeling falls largely upon the employer. It is impossible to create this relation if the employer puts on a counterfeit dignity in an effort to maintain a dead-line over which the employee must not cross. Dignity is not an outward sign, but an inward grace which is felt rather than seen. The man who does not feel quite sure of his fitness to rule holds himself aloof from his subordinates just as a bogus aristocrat endeavors to hide his humble origin behind artificial exclusiveness and simulated pride. When the knight, Lancelot, visited the Castle of Astolat he did not impose his superior rank upon the simple country folk but, as Tennyson puts it, moved among them like a "Kindly man moving among his kind."

That is the method of the man who feels sure of himself and is, I believe, the method of the future. The accidents of fortune should not prevent those in authority from moving in kindly fashion among their kind. We should make it a part of our business to know our men, their hopes, their fears, their aspirations and their troubles and stand ready at all times to give them help and encouragement. It should ever be kept in sight that the man who never wavers in his fidelity to his employer cannot be paid in dollars and cents and the confidence that you repose in him and your tacit recognition of fellowship is his only recompense. That is the policy, vaguely outlined, of the men in control of our allied companies and to the oft repeated question, "Does it pay?" they answer flatly and emphatically that it does.

In summing up it is difficult to avoid the conclusion that the position of an electric light company in its territory depends first, upon the character of its service and second, its attitude towards the public. The effect of the best conceivable service can be utterly ruined by a policy of indifference or negation. If we are to get the highest results we must go about our work with quiet enthusiasm, serenely confident in the excellence of our product and in the integrity of our purpose.

In closing I am sure that you will pardon me if I clearly define my commercial creed. I am a confirmed optimist and as far as is now expedient I carry optimism into my work. I believe that the world is constantly growing better and that each generation of men is better than the last. I believe that today is better than yesterday although I cannot see it. I believe that business is being conducted on a far higher plane than it was a generation ago. The old order is changing, yielding place to new and as men grow better business methods will change to meet the new conditions. There is a spirit of altruism in the air and the impulse of the day is upward. We see with a much clearer vision than of old our duty to our neighbor and the keynote of modern progress is humanity. Man never did so much for man as he does today. Let me quote a recent utterance of a latter-day philosopher who is no dreamer and believes nothing that cannot be proved. He says in describing the emergence of man from the animal and his subsequent development: "He was proud before he was kind; he was chivalrous before he was decent; he was tatooed before he was washed; he was painted before he was clothed; he built temples before he built a home; he sacrificed to his gods before he helped his neighbor; he was heroic before he was self-denying; he was devout before he was charitable. We are losing the savage virtues and vanities and growing in the grace of all the humanities, and this process will doubtless go on, with many interruptions and set-backs, of course, till the kingdom of love is at last fairly established upon the earth."

If this prophecy is true we, who are in very truth, the apostles of light and power, we who harness and sell the greatest force of modern civilization, should be the first to trim our sails to meet the trade winds of the future. We shall not live to see the fulfillment but we have seen the beginning and should be leaders rather than laggers in the train of Progress. We should intrench ourselves securely upon the vantage ground of truth and honesty and conduct our affairs upon the theory that mankind is ninety-five per cent. honest. We should place our business upon as high a plane as is compatible with a sound commercial policy. We should pursue our duties in our assigned paths with the highest ideals. We may fall far below them but it is not so much what we do in this world as what we try to do which counts the most in the long result of time. We must learn the luxury of being misunderstood. We must learn the sweetness of ridicule for, believe me, the derision of those who are content to slouch along old trails is the one unmistakable sign that we are on the right track.

President Campbell. One of the most impressive things to me in this meeting has been the fact that without prearrangement the papers and points of view of the different speakers have seemed to fit in with the spirit of the meeting. I do not know just how it came about, but I think you will all agree with me in that statement, and also in the belief that the meeting could not have ended with a better paper than that of Mr. Chase. (Applause.) It is bristling with good points. He mentions "the system" several times and seems to hate it with the same cordial hatred as Thomas W. Lawson. He has introduced many phrases that I think will live with us. Take "mechanical courtesy." I think he has made it clear that "mechanical courtesy" is one of the things which should be left out of our business system. He has also introduced the phrase, "the value of unexpected courtesy" and many others of a like nature. The paper is open for discussion.

MR. SANDS. I want to make a suggestion. I think I speak for two or three gentlemen sitting with me when I say that that paper leaves too good a taste in our mouths to be discussed at this time. I think we shall be better off to refrain from discussing it and take it home. (Applause.)

PRESIDENT CAMPBELL. Mr. Sands, I quite agree with you. I was almost tempted to make that suggestion myself, and yet I felt that in doing so I might lay myself open to the accusation of trying to rule too much with an iron hand. But inasmuch as it has come from another source, and has been carried without being put, I think we will consider that as very fitting and proper. Here is a telegram from Mr. Arthur Williams:

"Important matters in New York made it impossible for me to attend convention, which I regret exceedingly. Best wishes for success of meeting."

I know we are all sorry that we haven't Mr. Williams with us. Unless there is some other important matter to come before the convention, we will consider it adjourned. I want to thank you all for the enthusiasm and support you have brought here.

(ADJOURNMENT.)

THE
THIRD SEMI-ANNUAL
CONVENTION

PROCEEDINGS
of the
NEW ENGLAND SECTION
of the
National Electric Light
Association

THE MOUNT WASHINGTON HOTEL
BRETTON WOODS, N. H.
September 28 and 29, 1911

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New England Section of the National Electric Light Association

THIRD SEMI-ANNUAL CONVENTION, THE MOUNT WASHINGTON, BRETTON WOODS, N. H., SEPTEMBER 28 AND 29, 1911.

The third annual fall convention of the New England Section of the National Electric Light Association was held at the Mt. Washington Hotel, Bretton Woods, N. H., September 28 and 29, 1911, under the presidency of Mr. Howard T. Sands.

In calling the Convention to order on the opening day the President said:

I am very glad to welcome you all here today. This is a beautiful spot, almost too beautiful to try to do any business.

To our guests I will say that we want you to feel that you are one of us today, that you are at home here; we want you to feel perfectly free to enter into the discussions just as though you were a member of the Association.

To our members I would say, please remember that these guests are here, not as the guests of any individual member who may have invited them, but as the guests of this Association, and the guest badge is all the introduction they need. When you see anyone wearing a guest badge, feel it encumbent upon yourself to see that they have a good time.

The first thing in the order of business will be the report of the Secretary and Treasurer. According to our by-laws the report is made at the annual meeting, but as we had only a formal meeting in March we thought it best to give you a brief report showing you something of the condition of the Association. Mr. Holmes.

Mr. Holmes read the report of the Secretary, as follows:

REPORT OF THE SECRETARY.

Miss O. A. Bursiel.

By vote of the entire membership of the New England Section, taken by mail, the annual convention in March was given up owing to the fact that the National Association convention was to be held in New York City the last of May. We trusted that a large delegation from New England would attend this convention, and I am pleased to state that we had a splendid New England registration of 255 at the New York convention.

Your secretary went to New York a week in advance of the convention and assisted in the convention preparations. During convention week a New England Section headquarters was maintained on the sixth floor of the Engineering Building. Your secretary also assisted at the registration booth, where over 5000 were registered during the week. She was glad to welcome there the many familiar faces from New England.

Early in the summer it was deemed advisable that the New England Section be entirely self-supporting and not accept the very kind hospitalities of the Edison Company longer. Consequently, an office was secured in the new Lawrence Building, corner of Tremont and West streets, and the office moved the first of August. The Executive Committee meetings are held in this office and members are cordially invited to make it their headquarters when in town. This is the permanent home of the New England Section, where the correspondence, membership campaigns, collecting of interesting data in regard to operating methods of central stations and work of two conventions a year in New England are carried on. Copies of the Solicitor's Handbook, Classification of Accounts, Revision of the Question Box and the N. E. L. A. bronze buttons may be obtained at the Section headquarters.

Our membership is steadily increasing on a firm basis. We have at present a total of 760 members in the New England Section. Of these 119 are Class A members, a gain in the year of 12; 441 Class B members; 3 Class C members, a gain of 1; 42 Class D, a gain of 2; and 155 Class E, a gain of 52.

Mr. Holmes then read the report of the Treasurer.

REPORT OF THE TREASURER

This report for this meeting is abstracted, the regular report of the Treasurer, duly audited, coming at the annual meeting in March. We have received from the N. E. L. A. this year as refunds on dues $2,500. Our expenses have been $1,513.26, leaving a balance of cash on hand, September 26, of $986.74.

The President. Gentlemen, you have heard the reports of the Secretary and Treasurer. What action will you take on them?

Mr. Gibbs. Mr. President, I move that the reports be accepted as read.

The President. It is moved and seconded that the reports be accepted as read. Unless there is any motion to the contrary that vote stands.

(Mr. Holmes presiding.)

The President then read his annual address, as follows:

MEMBERS OF THE NEW ENGLAND SECTION, AND OUR GUESTS.

It is my privilege, and one which I deeply appreciate, to extend to you the greetings of this Association and to bid you all welcome to our Third Annual Fall Convention.

With such a representative gathering of New England Central Station Men meeting here—in the heart of New England—to discuss New England Central Station problems, the success of this Convention is already assured.

The reports of the Secretary and Treasurer, to which you have just listened, show very clearly the progress of the Association for the past year, but they fail to adequately convey the most excellent work which has been done by these two officials—and particularly, by our Secretary, on whom the major portion of the work has devolved. That our Association is today in the excellent condition that it is, both numerically and financially, is largely due to her untiring efforts. Due credit should also be given to your Executive Committee, many of whom have given a vast amount of time to the work of the Association at no little inconvenience to themselves.

During the past year, the National Electric Light Association, of which this section has the honor of being the largest geographic section, has experienced a growth unprecedented in its history. It has, at the present time, approximately 10,000 members, representing an increase of nearly 65 per cent for the past twelve months. It is now the largest engineering and technical association in the world and represents a tremendous force, both of brains and capital, all banded together for the advancement of the central station industry. What its ultimate membership may be, it is impossible for us to even approximately forecast; but even with its present membership, the need of localizing the work into State and Geographic Sections is readily apparent. At the present time, State Sections have been formed in Nebraska, Georgia, Pennsylvania, Mississippi and New Hampshire, aside from the two strictly Geographic Sections—namely, the New England Section and the Canadian Section. Doubtless, as different State Sections are formed in states contiguous to one another, these State Sections will be welded into Geographic Sections, thereby permitting of more effective cooperative work.

We are fortunate, here in New England, that being situated geographically in one corner of the United States we were enabled to take the last step first and form the Geographic Section at once; and I want to urge upon our Membership Committee the necessity of maintaining the reputation which we now hold—namely, of being the largest Geographic Section of the National body.

With the permanent abolition of the entrance fees, I do not see how any central station, large or small, can find any reasonable excuse for not joining our Association. The whole movement is a co-operative one, in which all should join for mutual benefit; but laying aside the higher question of co-operation and coming down to the more personal one of individual benefits to be derived, it certainly seems to me that the advantages offered through membership in the Association are so great as to make the cost seem meagre indeed.

This applies especially to the smaller plant, which cannot afford technically trained men in its operating force. Through the medium of the Monthly Bulletin, the reports of the various Committees and publications such as "The Solicitors' Hand-Book," it is able to obtain for a nominal sum, reliable information and instruction which it could not secure elsewhere except at a prohibitive cost. As for the Class B. member, I know of no way in which any ambitious young man who wishes to grow through increasing his knowledge of the art can better expend $5.00 than through Class B. membership. The Monthly Bulletin alone, if he studies it carefully, will be worth vastly more than that to him.

The report of the Public Policy Committee, which was presented at the New York Convention in June and which you have all doubtless read with interest, is another valuable contribution to the literature of the Association and shows that our industry is well in the front in dealing not only with the financial and technical questions but also with the sociological problems of our present day.

We have in the territory embraced in our New England Section three State Associations, two of which have not yet affiliated with the National Association. This matter has been presented to these Associations by Officers of both the New England Section and the National body, and it is to be hoped that in due time a decision favorable to affiliation will be reached. To my mind, a State Association within a Geographic Section is justified, providing its activities are confined to looking after matters of local and State polity. This is something in which the National body is not and should not be directly interested. I believe, however, that all matters connected with the advancement of the art, such as technical, financial and educational problems, can best be handled by the National Association and that through the medium of our Geographic Sections, we shall be able to apply this work more directly than is possible in an organization of the size of the National body.

I want particularly to call your attention to the new location of our Secretary's office or, to state more concisely, the new home of the Association. During the first two years after this section was organized, while the section idea was still in the experimental stage, the Edison Electric Illuminating Company of Boston very kindly came to our aid and through the thoughtfulness of its President, Mr. Chas. L. Edgar, made it possible for us to effectively carry on our work by providing us with quarters for our Secretary's office. I feel sure that every member appreciates to the full not only the courtesy extended by Mr. Edgar, but also the spirit in which it was extended; and I hope that some action will be taken by this Section, expressing in a more formal way our appreciation of his thoughtfulness. The Section idea is no longer an experiment. The New England Section has justified itself. It has reached a point where it is able to pay its own way and it will stand or fall on its own merits.

We want to make this office the real home of the Association; a place which every member will feel free to visit; and where I know he will be made welcome by our Secretary. We also want to make it a store-house of information for the Section, from which any member may feel free to draw at any time.

In this connection, I want to speak of the work of the Committee on Statistics, of which Mr. Chas. B. Burleigh is Chairman. The function of this Committee is to co-operate with the Secretary's Office in securing statistics or information desired by any member. This is not intended in any way to conflict with the most excellent work of the Question Box of the National Association, but to meet the needs of members desiring immediate information, which information after having been once secured should be passed on to the Question Box in the form of a question, with the answer in the subsequent issue, so that all may receive the full benefit thereof.

Another function of the Committee is to stimulate answers to questions in the Question Box from members of our section and particularly to interest members who have had some practical connection with the subject matter of the question. For instance; a practical question may be asked regarding line construction and one to which the Superintendent of the plant could doubtless frame a most excellent answer. Nevertheless I believe it is vastly better to have that question answered by either a line foreman or perhaps a lineman, thereby gaining the double advantage of getting the benefit of his practical experience and at the same time increasing his interest in the Association work.

During the past year, laws creating public service commissions have been enacted in the states of New Hampshire and Connecticut, leaving but two of our New England States in which there are no statutes relating to regulation and control of public utilities. I believe we should welcome the establishment of these commissions, provided the laws under which they are created are framed along sane and reasonable lines.

Our business is of such a nature that the interests of both the corporation and the public are best served by monopoly rather than by competition. That being the case, it seems to me to be highly desirable that there be some regulating body, clothed with ample power to safeguard the interests of both.

During the past year, one of our member companies has been confronted with the issue of municipal ownership. The Municipal Council of the City of Haverhill, Massachusetts, passed the two votes required by statute and in December the question was submitted to the voters at the regular City Elections. Between the final vote of the Council and the City Election there was an interim of about five months, and during this time it was freely predicted that owing to the socialistic reputation of Haverhill, the majority would be overwhelmingly in favor of municipalization. These prophesies were not realized, for when the result was announced, it was found that the citizens had voted over three to one against engaging in municipal ownership. This was a victory, not only for the Haverhill Electric Company, but also for every central station in New England.

As a result of the experiences of the campaign preceding that election, your President has urged upon the Executive Committee of the National Association the need of keeping in our Secretary's office in New York, accurate and up-to-date records regarding municipally owned and operated plants, which will be available at all times for member companies. This matter is now pending before that Committee and will, I feel sure, be given consideration in due time. This may seem to some of you an unnecessary precaution; you may think that here in New England the idea of municipal ownership is on the wane; but we must all bear in mind that we never can tell when we may be made the victims of political caprice. The politician knows that he can make no better grand-stand play than to bang the public service corporation and the threat of municipal ownership is his favorite club. His specious arguments, based upon the ideals of municipal ownership, will find ready ears and willing adherents and there is but one way in which to successfully meet these arguments—not with ridicule nor with theories, but with facts, cold facts and figures, which cannot be disproved.

In one of the principal cities of one state of our section, there has existed for nearly ten years competition between the two central stations engaged in furnishing the municipality with both light and power. The result has been prices which not only must have proved unremunerative to the companies themselves but also have stood as a menace to other companies in New England who were endeavoring to obtain fair and reasonable prices for their service. This condition was brought to the attention of the Association, and we were asked if in any way we could render assistance. Steps were taken at once to secure a conference between the officials of both companies and I am pleased to state that these two companies have now been consolidated and it is to be hoped that in due course of time the business and the rates will be re-established upon a sound commercial basis. This removes the most aggravated case of unlimited competition existing within our territory.

At the Convention held at New London last year, a committee was chosen to investigate the rates for electric service charged by our member companies. This committee was chosen because of the many inquiries made upon the Secretary's office for information not only regarding rates in force but regarding the fundamental principles of rate-making. The question of rates is one of the most important which confronts us today, and it was believed that this association could render no better service to its members than by a careful and comprehensive study of the rate question.

It was the intention that this committee should be a continuous body for some years to come, taking up in turn each class of service, studying the rates charged for that service by our members, and reporting to the association their observations and recommendations. Thus far, the committee has devoted its time to the rates charged to municipalities for street lighting service and it is a matter of deep regret that the removal of the Chairman, Mr. Donald C. Barnes, to the State of Washington rendered it impossible for us to have a report from that committee at this Convention. It is to be hoped, however, that at our next Convention this report will be forth-coming, and I know that it will be received with interest by every member.

I want to bespeak for this committee your hearty co-operation. Doubtless you may receive from them requests for information which may seem to you needless, but please bear in mind that if they are to arrive at any intelligent conclusion of the rate situation in New England, it will be necessary for them to thoroughly understand the conditions throughout our territory.

President Campbell, in his address at our March Convention, spoke of the question of holding only one convention a year. Your Executive Committee has taken no action in this matter, due to the fact that by vote of the members the March meeting was omitted this year on account of the proximity of the New York Convention, so that this association has had but one convention this year. The question which we must now settle is whether it is better for us to continue our present practice or to omit our winter Convention, perhaps continuing our Fall Convention for a day longer so that the real constructive work which the association desires to do may not suffer in any way. I presume the principal reason why we have hitherto had two conventions a year is that this was the practice of our predecessors, the Electric Lighting Engineers of New England, and while there is much to be said in favor of continuing that practice, there is also equally as much to be said on the other side, and I hope before this convention ends that an opportunity will be afforded for an expression of opinion on this subject by the members present.

As to the future of the New England Section, I am decidedly optimistic. Although but three years old, we have a membership of 760, while the membership of the Electric Lighting Engineers of New England was never over 135. Our membership in the near future ought to reach twelve or fifteen hundred. There are at least 700 more members in our own territory today who ought to be within our membership and who, I believe, if they realized the scope and importance of the work of this association would be not only willing but glad to join us.

It is my ambition to see this association what its name implies—a New England Association. Let us make it our aim to advance the central station interests of New England. Let us get together in these conventions and thrash out those problems which are peculiar unto New England. Let us not rest content until every central station in New England is enrolled in our membership.

Co-operation is the key note of the present day; let us make it the key note of this Association. The man in the small plant needs the specialized knowledge which the man in the larger plant, by virtue of its organization, has been able to obtain; and just as truly that man with the highly specialized training needs the results of the more practical and broader experience which the man in the smaller plant is bound to receive. It is a case of give and take all along the line.

The old idea of a one-man world is a thing of the past. Gradually but certainly we have come to learn the lesson of mutual dependence. We have awakened to a larger conception of our duties as public service corporations. Our present day standards are fixed and governed by this broader vision. Let us all join together in making the New England Section a mutual effort to help each other and thus fit ourselves both as an association and as individuals to better discharge our duties—to serve the public.

SYNCHRONOUS CONDENSERS

BY

Charles T. Mosman

General Electric Company, Boston.

1. An alternating current flowing in a circuit such as a wire, or the windings of a transformer or of an induction motor, may be resolved into two components: one an energy component in phase with the electromotive force applied to the circuit, the other displaced ninety degrees of phase from that electromotive force and hence representing no consumption of energy and called wattless. This latter component is due to the induction of cables, transformers, induction motors, etc.

2. The product of the current component in amperes by the impressed electromotive force in volts gives respectively, volt-amperes energy and volt-amperes wattless, or dividing by 1000 gives kilo-volt-amperes energy=kilowatts and kilo-volt-amperes wattless. The combination of both components gives the total K.V.A. or apparent load. The ratio of energy component to the total $(\frac{\text{KW}}{\text{KVA Total}})$ is called the Power Factor.

3. The above may be illustrated diagramatically by Figure 1.

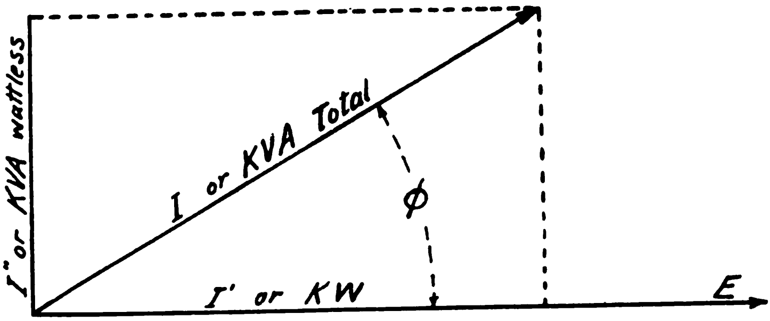


Fig 1

The electromotive force E is taken as the basis of phase;
I′ is the energy component of the current;
I″ is the wattless component of the current;
I is the total current;
Φ is the angle of lag of total current behind the electromotive force. Inspection will show that the cos. of this angle is $\frac{I'}{I}$; this is also the ratio called Power Factor. The ratio $\frac{I''}{I}$ is the sine of the angle Φ and may be called the wattless or inductive factor. In the diagram we may replace I′ by Kilowatts, I″ and I by K.V.A. and Cos. Φ or Power Factor $=\frac{\text{KW}}{\text{KVA (Total)}}$

4. The power factor of the current taken by constant potential transformers is high, practically 100% under normal load conditions, but very low at no load as then the magnetizing or wattless component of the current input becomes a large percentage of the total, the energy component representing only the iron and copper losses. The power factor of an induction motor is relatively low even under load conditions, due to the air gap in the magnetic circuit which necessitates a large magnetizing current. At light loads

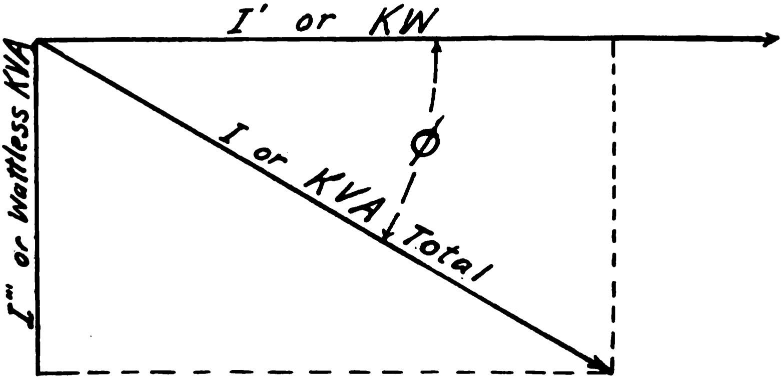


Fig. 2.

the power factor decreases considerably, being very low at no load. Constant current transformers for the operation of series lighting circuits, including the circuit, have a low power factor when fully loaded and very low power factors at light loads due to the method of regulation.

5. The wattless components so far considered have been lagging, or later in phase position than the electromotive force. Figure two illustrates the case of a leading wattless component and total current.

Φ being now angle of lead instead of lag, and power factor $=$ Cos. $\Phi = \frac{I'}{I}$ as before.

6. If Figures 1 and 2 are combined we find that the wattless components leading and lagging are in opposition and tend to mutual elimination. See Figure 3.

If $I''=100$; $I'''=80$ and $I'=100$, the resultant wattless component becomes 20 lagging, and the total current $\sqrt{100^2+20^2}=$ 102, and the power factor $\frac{100}{102}=.98$; whereas considering the lagging component only the total current would have been $\sqrt{100^2+100^2}=141$. The Power factor would have been $\frac{100}{141}=.71$

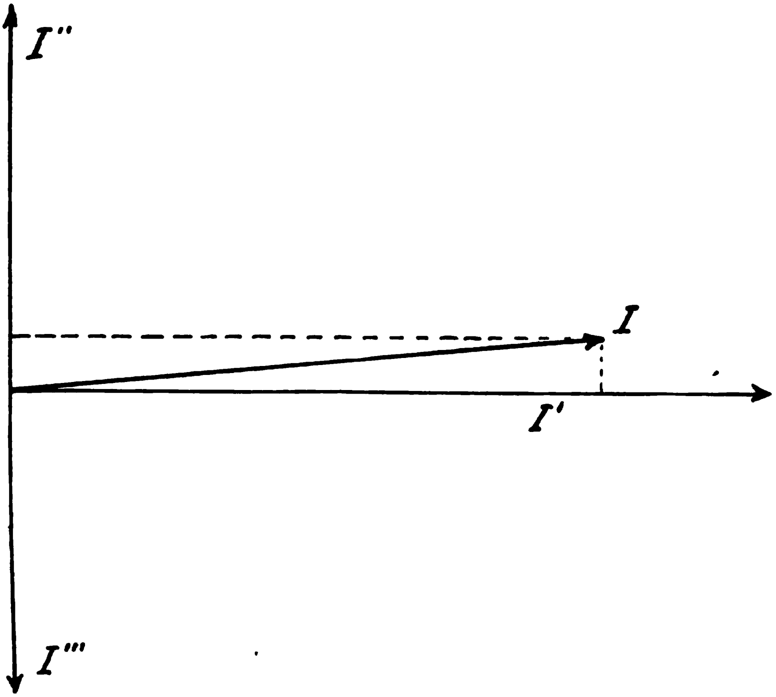


Fig. 3.

7. It is evident that adding to a circuit wattless current, which may be lagging or leading at will, results in control of the power factor. The practical method of doing this is by means of the synchronous condenser.

8. Before describing the synchronous condenser and its application, it is well to note the objectionable effects of lower power factor on commercial circuits and plants.

9. The most important cause of low power factor is the induction motor. The tendency of the times is toward individual drives and small motors, and hence lower power factors. The tendency should also be toward a careful study of each installation and a proper fitting of each motor to the

work to be done, and hence a raising of power factor due to fewer underloaded motors.

10. An inspection of diagrams 1 and 2 shows that the low power factor means large total currents; at .80 power factor the total current for doing a certain work is 25% larger than would be the case with power factor 1. The heating of lines, transformers, generators, etc., is related to the square of the total current. The necessary capacity of apparatus to supply a certain amount of energy is inversely proportional to the power factor.

11. Lagging currents have an objectionable effect on the regulation of lines, transformers and generators, greatly increasing the drop of voltage with load. An alternating generator of 8% regulation on load of power factor 1.0 will have a regulation of approximately 25% at .75 power factor lagging. A transformer having a regulation of 2% on load of power factor 1.0 may have a regulation of 4% to 5% on load of power factor .75 lagging. A three phase line delivering 1000 Kilowatts a distance of five miles over No. 0 wire at delivery voltage of 6000, will show the following voltage drops at various power factors:

Power factor .70 drop in % of delivered voltage 16.
" " .80 " " " " " " 14.
" " .90 " " " " " " 11.
" " 1.00 " " " " " " 7.

Thus the regulation at .7 power factor is 45% greater or poorer than at power factor .9 and 130% worse than at power factor 1.00.

12. A generator to deliver 1000 Kws. at .7 power factor must deliver 1430 K.V.A. and hence be nominally of 1430 Kw. capacity. This generator will require from 30% to 50% larger amperes and 70% to 120% larger kilowatts excitation, depending on the type of generator, to maintain the bus voltage with 1000 Kw. load at .7 power factor, *i. e.*, 1430 KVA, than for 1430 KVA, 1.0 power factor. I might

say here that the kilowatts excitation are based on the use of a generator potential regulator, so that the excitation voltage varies as well as the amperes. This heavy excitation means increased heating in the generator fields and it is frequently found that this heating or the limitations of the exciting system impose a limit on the generator output. The prime mover driving this generator need be equivalent to only 1000 Kw. energy output instead of to 1430 Kw. energy output. If the generating units in a station supplying the above load are of 500 Kw. capacity at 1.0 power factor, and the prime movers are sufficiently large to drive the generators at full rating energy load and overloads, then it will be necessary to operate three units to carry 1430 KVA, whereas there is only sufficient load for two prime movers, *i. e.*, 1000 Kws. If the units are each of 1000 Kws. capacity, 1.0 P. F., then two must operate on energy load sufficient for the economical operation of but one.

13. Thus it is shown that low power factor results in:

Increased losses in lines and apparatus;
Poorer regulation in lines and apparatus;
Wasted capacity in lines and apparatus;
Wasted capacity in exciting system;

Discrepancy between capacity of generator and its prime mover.

14. It is evident that a reasonable investment solely for the purpose of raising the power factor of a system is justifiable; and that the nearer the load or source of low power factor, and hence the farther from the generating station the improvement in power factor is made, the better, as thereby the greatest gain in regulation and the greatest saving in lines and apparatus is made, as distribution lines, transformers, transmission lines and generators will all be benefited.

15. The power factor and efficiency are closely related in the design of an induction motor. One may be improved at the expense of the other. The power consumer is generally much more interested in high efficiency than high power

factor. The central station may appear to be more interested in power factor than in efficiency, but as satisfied customers are necessary to success, this is not so and it is better for the central station to face the situation by independently raising the power factor of the system to an economical point.

16. By varying the excitation of any synchronous machine, generator or motor, which is connected to the same system with another synchronous machine, the phase relation of the terminal voltage and the current taken by the machine may be varied, and consequently the amount of current taken also varied. An under excited generator or motor will receive excitation from the system by alternating currents and an over excited motor or generator will deliver excitation to the system in like manner.

17. In the case of two generators the alternating excitation current which is wattless is leading in the generator receiving it and lagging in the generator delivering it. If the power factor of the load is 1.00, the current flowing in each generator is increased by the alternating exciting current. If the power factor of the load is less than 1.00, the current of one generator may be increased and the other decreased thereby, the desirable condition being when the power factor of the output of each generator is the same as that of its load.

18. A synchronous motor under excited receives alternating excitation from the system by means of a wattless current which is lagging with reference to the system; if over excited, it delivers excitation to the system by means of a wattless leading current.

19. The tendency is always toward an equalization of excitations among synchronous machines by means of wattless alternating currents.

20. The total current input to a synchronous motor will be the resultant of an energy component representing the work the motor is doing, plus the losses of the motor and a wattless component which may be leading, lagging or zero, depending upon the excitation. If the synchronous motor does no work

but simply furnishes wattless leading currents, the machine becomes a synchronous condenser.

21. A table of natural sines, cosines and tangents of angles gives a ready means of resolving a current into its components and determining the condenser capacity necessary to produce desired results.

22. The cosine of an angle is equal to the power factor of a load having that angle of phase displacement of current from voltage; it is also numerically equal to the ratio of the energy component to the total of that current. Likewise, the sine of the angle represents the inductive factor and the wattless component. The tangent of the angle of phase is numerically equal to the ratio of wattless component, divided by the energy component.

See Table No. 1. This table is not supposed to be complete enough to use in all cases. It just touches the high spots.

Cosine or Power Factor of Energy Component	Sine or Inductive Factor or Wattless Component	Tangent or Ratio of Wattless to Energy	Approx. Angle
1.00	0	0	0
.99	.14	.145	8°
.98	.20	.203	11° 30′
.97	.242	.249	14° 0′
.95	.312	.328	18° 10′
.93	.367	.394	21° 30′
.90	.436	.484	25° 50′
.85	.527	.619	31° 45′
.80	.600	.749	36° 50′
.75	.660	.880	41° 20′
.70	.713	1.017	45° 30′
.65	.760	1.171	49° 30′
.60	.800	1.335	53° 10′

23. This table shows that a load of power factor .75 has an energy component 75%, and a wattless component 66% of the total. If it is desired to raise the power factor to .9

and keep the total KVA the same, the table of sines shows that the wattless component must be reduced to 43.6%, or we must furnish a wattless leading current equal to 66.—43.6=22.4% of the total KVA. If it is desired to keep the energy component of the load constant and reduce the total KVA by raising the power factor, which is the usual case, the table of tangents shows that the wattless component must be reduced from 88% to 48.4%, or by 39.6% of the energy component. If in the above examples the total KVA is 1000, the energy component or Kilowatts will be 750 and the lagging wattless component 660 KVA. Hence to raise the power factor to .9 and keep constant KVA, we must use a condenser of 224 KVA capacity and to keep constant Kw., one of .396 x 750=297 KVA.

24. Neither of the above examples takes account of the losses in the condenser itself. These losses will have little effect in determining the size of the condenser. A 300 KVA synchronous condenser will have about 18 Kw. losses, of which excitation will be about 4 Kw. If the condenser is at the far end of the line, its total losses must be added to the energy component of the line; if it is in the generating station its excitation may or may not add to the energy load on the generators. Applying the former case to the above illustration for constant energy component of the load; the total energy load at .9 power factor will be 750 plus 18=768 Kws.; the total KVA 768 divided by 9=854, and the wattless component 854 x .436=372 KVA, and thus the condenser input, 660—372=288 KVA.

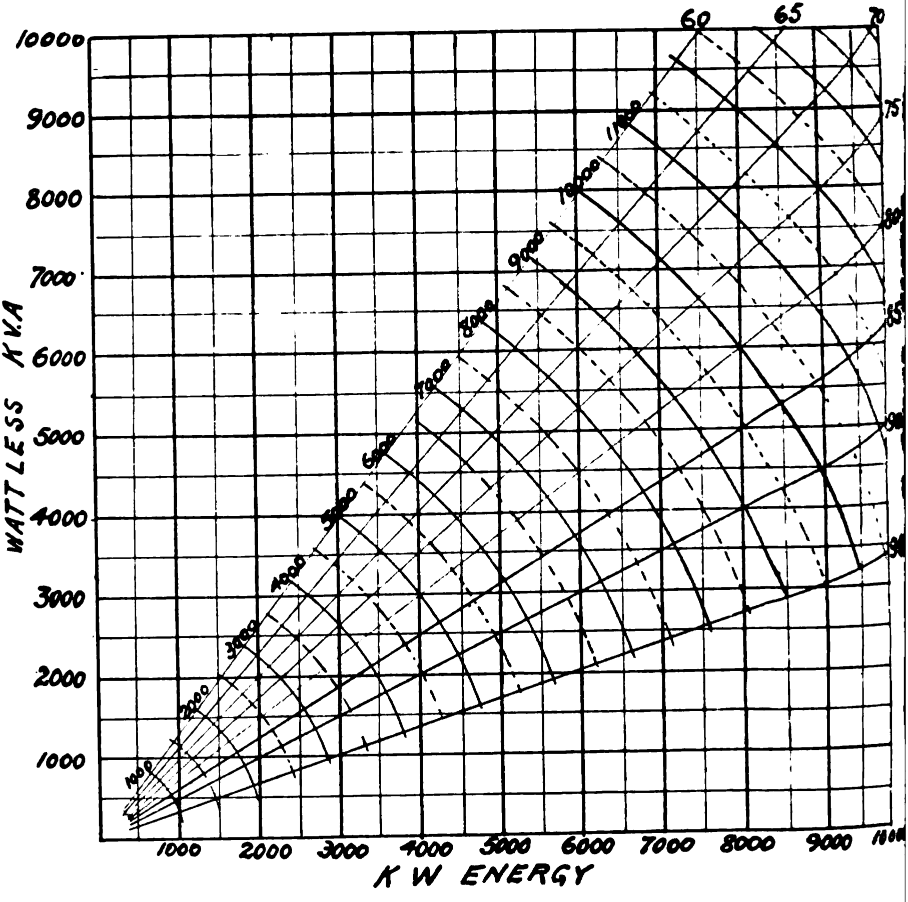
25. This same ground may be covered diagramatically by reference to Figure No. 4. This diagram consists of a number of superimposed triangles, one for each power factor, thus giving the energy component, wattless component and total KVA for any power factor and load. By dividing or multiplying the KVA and Kw. scales of this diagram by the same number, its range may be so increased that it may be applied to any problem:

26. Figure No. 5 gives a still more convenient form of diagram for quick work where the load in Kw. is to be held constant. This diagram is plotted from the table of tangents and is based on an energy load of 1000 Kws.; for other loads, the values of wattless KVA should be proportionally increased or decreased. To illustrate the use of this diagram, take the example previously given; 750 Kws. at .75 power factor, to raise to power factor .9 :— follow the .75 curve from the bottom of diagram up until it just intersects the vertical line passing through .9; from point of intersection follow horizontal line to the right and read from the scale 395. $395 \times \frac{750}{1000} = 296$ KVA, which is the size of condenser necessary. If it is desired to raise the power factor to 1.00, follow the curve until it is tangent to the vertical line from 1.00, and read 880, which multiplied by .75 gives 660 KVA capacity of condenser. If it is desired to raise the power factor to .90 leading, follow the curve until it intersects the vertical line from .9 the second time, and read at the right 1365, which multiplied by .75 gives 1024 KVA as the size of condenser.

27. An inspection of table No. 1 shows that the nearer the power factor is to 1.0, the greater condenser capacity is required to raise it a certain number of points, for example, if a generator is fully loaded at .75 power factor and the prime mover is capable of operating it at full load, 1.0 power factor, and it is desired to increase the output of the unit by raising the power factor of its load, then from the table we get the following.

Table No. 2.

Increase of Power Factor	Condenser Capacity required in % of Generator Rating	Increase in Generator energy output in % of Generator Rating
.75 — .80	6.0	5
.80 — .85	7.3	5
.85 — .90	9.1	5
.90 — .95	12.4	5
.95 — .98	11.2	3
.98 — .99	6.0	1
.99 —1.00	14.0	1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9000
8000
7000
6000
5000
4000
3000
2000
1000
WATTLESS K.V.A
1000
2000
3000
4000
5000
6000
7000
8000
9000
K W ENERGY
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
60
65
70
75

Fig. 4.

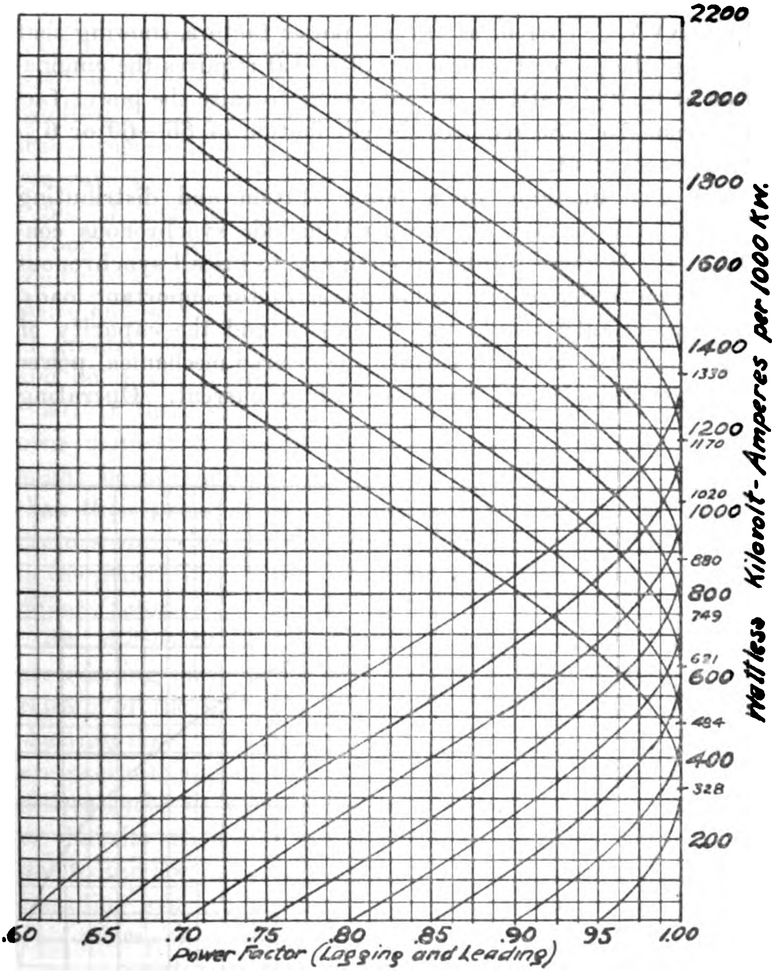

2200
2000
1800
1600
1400
1330
1200
1170
1020
1000
880
800
749
621
600
484
400
328
200
Wattless Kilovolt-Amperes per 1000 KW.
.60
.65
.70
.75
.80
.85
.90
.95
1.00
Power Factor (Lagging and Leading)

Fig. 5.

28. This Table No. 2 is illustrated diagramatically by Figure 6 which shows the wattless component as a % of the total KVA, or current at various power factors, showing that to raise the power factor from .95—1.0 requires the elimination of 31.2% wattless current; while to raise the power factor from .75—.80 requires the elimination of 66—60 or 6% wattless current.

29. The planning of a power station and distributing system may or may not properly include synchronous condensers. If there will be opportunity to install synchronous motors on feeders carrying low power factor important loads, the opportunity should not be missed and the capacity of motor made sufficient to furnish the desired mechanical power and also the desired wattless leading current. Operating

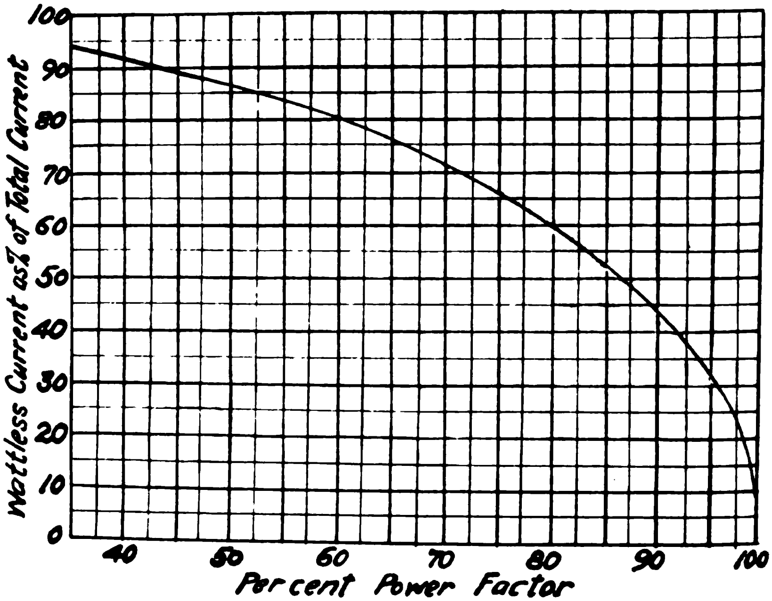


Fig. 6.

such a motor at .71 power factor leading gives a very efficient use of material, the wattless component then being also .71 and the total KVA capacity of the motor 1.00, *i. e.*, a 500 KVA motor could take 355 Kws. energy and 355 KVA wattless leading from the line by means of the synchronous motor, resulting in considerable saving in step-up and step-down transformers, if there are to be any, and lines, as well as in generators.

30. If there are no possible opportunities for large synchronous motors, it may pay to install purely synchronous condensers out on the feeders, making the same saving as above and securing the same improvements in regulation, but at greater outlay, as no work will be done by the condenser and no direct revenue be received from it.

31. If there should be no opportunity to install synchronous motors or synchronous condensers on the feeders, it might be advisable to install generators sufficiently larger than their prime movers to be adapted to commercial power factors and with fields designed consistently, than to install in the generating station synchronous condensers to raise the power factor.

32. Where an existing plant finds that its prime movers are running underloaded with generators loaded, or that the raising of the power factor a reasonable amount will allow shutting down a generating unit, or that its generator fields are overheating, or that its exciting system is not able to deliver sufficient voltage to maintain the generator voltage, or that its wires and cables are overloaded on some feeder due to the low power factor, then should that plant consider installing synchronous motors or synchronous condensers on its feeders, or failing that, a synchronous condenser in the generating station.

33. A synchronous motor or synchronous condenser at the end of a transmission line may have its excitation controlled by a generator potential regulator so as to maintain a constant voltage at that point on the transmission line, the size of condenser and the ratio of the potential at that point to

the potential at the generating station depending upon the characteristics of the load and of the transmission line.

34. Within reasonable limits of energy load variations, a synchronous motor with fixed excitation may be used to also deliver leading current to a feeder. The usual motor may be used to run at 71% of its capacity energy load and 71% wattless leading, and this leading component will not vary greatly in value while the energy component is varying from zero to the 71% value or even higher, while the excitation of the motor is fixed. If however, the total load on the feeder is quite variable the synchronous condenser or the synchronous motor should be equipped with a voltage regulator set for a constant voltage and provided with a stop so that the condenser or motor may not be too heavily overloaded by wattless current.

35. Table 3 shows a standard list of synchronous condensers designed especially for the purpose. These may be used to carry mechanical load by direct connection but not by belting. In other words, the bearings of the machines are not designed for the belt pulley.

TABLE No. 3.

SYNCHRONOUS CONDENSERS—THREE PHASE, 60 CYCLES, 2300 VOLTS.

Type	Poles	KVA Capacity	Speed	Volts	Provide exciter Kilowatt 125 Volts	Approx. Kw. Loss at full KVA Input
ATI	8	200	900	2300	5	14
ATI	8	300	900	2300	6.5	18
ATI	8	500	900	2300	8.5	27
ATI	10	750	720	2300	12	34
ATI	10	1000	720	2300	15	45
ATI	10	1500	720	2300	16	60
ATI	14	2500	514	2300	27	100
ATI	24	5000	300	2300	60	200

36. Standard generators may be used as synchronous motors or condensers by making proper changes in the field poles and windings to render them self starting, and safely insulated against voltages induced in the field when starting.

ILLUSTRATIVE INSTALLATIONS.

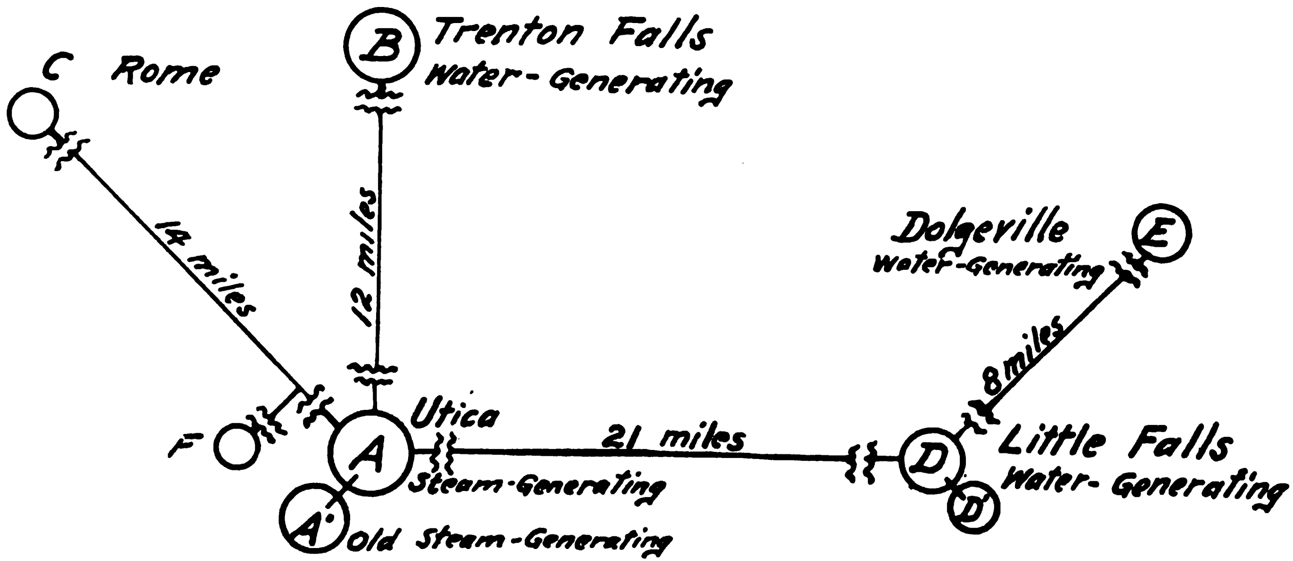
37. The Utica Gas and Electric Company operate a system indicated by Figure 7.

The loads given in Figure No. 7 are for the day only and are fairly constant and at power factor .7. There is a surplus of water power at B, but very limited water power available at D′ and E. The low power factor resulted in low voltage at distributing points; over heating of generators and transformers; wasted capacity in apparatus and lines; excitation system at its limit.

38. Synchronous condensers were resorted to as follows: At C a 1000 KVA with generator voltage regulator; at A the 750 Kw. and two 300 Kw. generators were operated as condensers, and a 1500 KVA condenser and regulator ordered; at D a 750 KVA condenser with regulator has been installed, and condensers have been recommended for installation at F and at A.

39. After the installation of the condenser at C, readings were taken as follows: Without the condenser, line volts 91; Kws. load 580; Amps. 265; power factor .60, KVA 967; later in the day with condenser connected, line volts 103; Kws. load 700; Amps. 220; power factor .82, KVA 855. In this case the .82 power factor was leading and the condenser was furnishing a surplus of leading KVA to assist the other stations on the line. It should be noted that there was a 13% gain in voltage shown and probably a much greater gain as the load had increased and the natural voltage delivered by the line probably had fallen when the second set of readings was taken.

40. This system is peculiarly adapted to the use of condensers, and when it is fully equipped with condensers and


C
Rome
B
Trenton Falls
Water-Generating
14 miles
12 miles
Dolgeville
Water-Generating
E
8 miles
F
A
Utica
Steam-Generating
A'
Old Steam-Generating
21 miles
D
D'
Little Falls
Water-Generating

A. Steam Turbines and Engines; 3000 KW capacity
A'. Shaft-Driven, 1-750, 2-300; Load 3000 KW.
B. Water-Wheel Driven; 4000 KW capacity
C. Sub-Station; Load 1000 KW.
D. Water-Wheel Driven; 1-400 KW., Load 800
D'. Water-Wheel Driven; 1-1200 KW Capacity.
E. Water-Wheel Driven; 2000 KW Capacity Load 200.
F. Mills, Sub-Station; Load 1100 KW.

Fig. 7.

regulators, excellent voltage regulation should obtain over the entire system, even with the great bulk of the power generated at one station.

41. At a sub-station about 1½ miles from the generating station, the Taunton Municipal Plant recently installed a 500 KVA synchronous condenser, coupled to a 100 Kw. 550 volt direct current generator, thus forming a motor generator set. Excitation is obtained from an exciter belted to the motor generator set. The above set replaced a D-62 generator belted to an induction motor.

42. This condenser is intended to raise the power factor of a generating station load of 938 Kw. at .765 power factor, or 1225 KVA to .96 power factor or 980 KVA, thus reducing the load on the generators by 245 KVA and at the same time serve a load of 65 Kws.

43. The following readings were taken January 31st, by Mr. Coleman, after the installation of the condenser:

Condenser off 9.00 A. M. 624 KVA., 450 Kws., .72 power factor
" on 9.10 A. M. 469 KVA., 450 Kws., .98 " "
" on 5.30 P. M. 777 KVA., 750 Kws., .965 " "

The generating station equipment consists of two 400 Kw. engine driven units and one 1500 Kw. turbine unit.

44. Previous to the installation of the synchronous condenser the 400 Kw. generators were operated at heavy current overloads and at very high excitations, in fact at the limit of the exciter voltage available, 140 volts. Since the installation of the condenser the two 400 Kw. generators carry the day load very comfortably with an exciter voltage of 110. The drop in the feeder to the sub-station has become a voltage rise.

45. If the condenser had not been purchased it would have been necessary to run the 1500 Kw. turbine on less than half load. There is no doubt that the condenser results in a substantial improvement in station economy.

46. The Attleboro Steam and Electric Company recently installed a 500 KVA synchronous condenser driving a 50

Kw., 125 volt direct current machine serving as an exciter for the station. This set was installed to raise the power factor of a load of 600 Kws. from .68 or 880 KVA to .97 or 620 KVA, thus reducing the KVA load on the generators by 260 KVA and securing 50 Kw. useful output. Excitation was previously obtained from a 27 Kw. induction motor generator set.

47. The generating equipment consists of two 750 Kw., 937 KVA horizontal turbo sets.

48. The following readings were recently taken when one generator was carrying the load and its voltage controlled by a regulator: condenser running; generator amps. 177; volts 2300; Kws. 670; KVA 704; power factor .95; excitation of generator 11.8 Kws.; excitation of condenser 5.9. Condenser shut down: Gen. amps. 270; volts 2340; Kws. 680; KVA 1092; power factor .624; excitation of generator 15.1 Kws. The pointers of the generator and generator field ammeters were off the scale and hence the latter set of readings is quite approximate. But for the synchronous condenser it would have been necessary to run both generating units at considerable loss in station economy.

49. Mr. Tregoning states that repeated trials have shown a saving in coal per Kilowatt Hour output of the station when the condenser is operating and one generator carrying the load compared to carrying the load with one generator and no condenser, due to the reduction in losses in the 750 Kw. generator by the improvement in conditions.

50. The Hartford Electric Light Company has made two installations of condensers at the end of feeders and is contemplating another. Mr. Lawton has very kindly furnished the following information.

51. One of these installations is at the plant of the Pope Manufacturing Company, which is connected to the generating station by six thousand and fifty (6050) feet of four conductor 4/0 cable, and 6000 feet of 4/0 overhead lines, making a total of 12050 feet and forming a two phase 2400 volt feeder. The condenser is of 200 KVA, 220 volts and

450 amperes capacity and serves no mechanical load. The factory load is served at 220 volts through step-down transformers. When the condenser was first installed readings were taken with the condenser under-excited, neutral and over-excited, noting the effect on the system as follows:

	Input to Condenser			FEEDER				
				LOAD				
			Excit.	Amps. per	Kw.		VOLTS	
	Amps.	Kws.	Kws.	Phase	Total	P.F.	Deliv.	Station
Lag	300	9	1.2	165	528	.64	2070	2514
Neutral	0	9	3.0	147	520	.71	2195	2504
Lead	300	12	4.5	126	504	.82	2260	2515
Lead	450	19	7.0	124	512	.82	2280	2504
Lead	600	24	9.0	112	520	.92	2312	2515

52. Another installation is at the Pratt & Whitney factory which is served from the Pearl Street distributing station through two cables each 4650 feet long and of four conductor 4/0 cable. The condenser is of 200 KVA capacity and serves no mechanical load. The following readings were taken:

	Input to Condenser			FEEDER				
				LOAD				
			Excit.	Amps. per	Total		VOLTS	
	Amps.	Kws.	Amps.	Phase	Kws.	P.F.	Deliv.	Pearl St.
Lag	400	9	15	223	682	.64	226	2390
Lag	300	9	20	219	712	.67	229	2410
Neutral	0	10	34	192	672	.72	232	2420
Lead	300	15	52	171	659	.80	234.5	2420
Lead	450	22	61	163	679	.83	235	2425
Lead	590	27	70	159	682	.88	235.5	2425

Pearl Street is served through 6363 feet of cable from the steam station and hence its voltage will be affected by the current taken by the condenser.

53. Throughout both of the above tests the factory loads were going through their usual variations and hence the relative values given must not be scrutinized too closely.

54. These two installations illustrate the saving made possible through the use of a synchronous condenser advantageously placed, in secondary cables, step-down transformers, underground cables and conduits. The last item may be of great importance and justify heavy investments in condensers.

55. The cable having little or no inductance does not lend itself so well to voltage control at the end of a feeder as does an overhead line, but the reduction of the current to be carried by the cable is of vital importance. The four conductor 4/0 cable referred to above becomes quite hot at 160 amperes per conductor.

56. Another installation of a synchronous condenser is planned by the Hartford Electric Light Company at a silk mill 11.7 miles from the steam plant. There will be step-up transformers, a 11,000 volt transmission line (1½ miles of which is underground cable), step-down transformers with 440 volt secondary, and considerable 440 volt cable. The condenser will be of 200 KVA capacity and will furnish 75 H. P. to drive a ventilating fan. The motor load of the plant is estimated to be 600 KVA at .71 power factor. When the fan is taking 75 H. P. and the total input to the condenser is 200 KVA, the total load will become 460 KVA at .93 power factor. In this case there will be a 25% saving in cables, lines and transformers due to the synchronous condenser. The advantage to the consumer in improved service and reduced cost of cables and transformers justified his investing in the condenser.

57. Manufacturing plants are alive to the advantages of the synchronous condenser and a number have installed them with decided benefit to the generating and exciting equipments, saving in cables and improvement in regulation. One interesting example is that of the Saxony Worsted Company.

58. This plant installed a 600 KVA generator direct connected to an engine. The power factor of the plant was estimated to be .85 and hence the engine was designed for

driving 600 x .85 or 510 kilowatts. The eventual development of the plant introduced individual drive extensively, particularly some very slow speed motors of necessarily low power factor, and which were frequently stopped and started, with the result that the power factor of the load was found to be .65. With this power factor the generator was fully loaded when only 390 Kws. was being generated.

59. A 300 KVA condenser, having no mechanical load, was installed at the generating station and served to raise the power factor to .85, thus raising the energy load to 510. The energy required to drive the condenser is 16 Kw. and hence there is a gain of 104 Kws. in station output at the same KVA load on the generator.

There are a number of other manufacturing plant installations which might be described if time would permit.

MR. HOLMES. Gentlemen, you have heard the address of President Sands. What is your pleasure?

MR. SMITH (Salem.) Mr. Secretary, I move that the report of the President which we have just listened to be referred to the Executive Committee for their consideration and report to this convention tomorrow for our action.

(The motion was adopted.)

(President Sands presiding.)

THE PRESIDENT. Before getting down to the papers there are one or two matters that we wish to take up.

One of our members, Mr. Rowell of Plymouth, was unfortunately stricken ill on the train yesterday and was obliged to be taken from the train at Portsmouth and carried to the hospital. We have kept in touch with him, and the report this morning is that he is very much better and out of danger; but it seems to me that it would be very nice if some message could be sent to him from the Association expressing our sympathy and wishing for his speedy recovery, and I should be very glad to entertain a motion along that line.

Mr. Campbell I move that the Secretary be requested to send a telegram in the name of the Association to Mr. Rowell.

(The motion was adopted.)

The President. Mr. Mosman has given us a most excellent and comprehensive paper, and one which should admit of a great deal of discussion, and I hope we will have it. At our last convention President Campbell made what was to my mind a most excellent ruling, namely, that the Chair would not entertain any speaker until he had announced his name, even though the Chair might know him very well indeed. For that reason I will ask you all to bear it in mind, and as you enter into the discussion to please announce your names.

I am going to ask Mr. Boyden if he will open the discussion on Mr. Mosman's paper.

Mr. Boyden. This discussion is by Mr. L. L. Elden, and I fully agree with him in its entirety.

Mr. L. L. Elden. (Paper read by Mr. Boyden.) This excellent paper by Mr. Mosman may almost be said to be the last word as a demonstration of the mathematical theories governing the action of synchronous condensers, and any discussion on this subject naturally turns to the causes which create a demand for their use.

We may summarize the conditions and locations in a central station system where the application of condensers is generally advisable.

First: In generating stations of systems of low power factor, to raise the power factor of the system for the benefit of the generator equipment.

Second: In sub-stations of transmission systems of low power factor, to raise the power factor of the entire system from generators to sub-station, thus conserving investment and improving operating conditions.

Third: In consumers' premises where the nature of the business served results in power factors too low to be acceptable for central station connection.

In this discussion it is intended to omit from consideration systems that regularly employ synchronous apparatus in generating or sub-stations for conversion or power producing purposes, notwithstanding that it is customary in such systems to take advantage of the characteristics of such apparatus to keep the power factor at a high point.

The author has suggested that the most important cause of low power factor is the induction motor. This is undoubtedly true, although certain commercial operations such as electrolytic reduction processes, steel furnaces, etc., contribute in a measure to the prevailing evil of low power factor.

It will undoubtedly be admitted that from all points of view the use of synchronous condensers is undesirable if they can be dispensed with, all of which leads to the desirability of improvement in motor conditions. Improvement in motor conditions does not necessarily mean improvements in the motors themselves, but rather in their application. Observation of many undesirable installations brings out the fact that the persuasive abilities of the sales agent in many such cases has resulted in sales of motor capacities far in excess of those actually required by the consumer.

This tendency to install motors too large for the duties they are to perform should be checked, and it is to the manufacturer that the central station companies must naturally turn for assistance. The manufacturer with his wide experience and authoritative data on every conceivable subject relating to consumption of power, can, if he will, so guide a purchaser or his engineers, that low power factor conditions so detrimental to central station interests need not occur. That this course is not followed is easily capable of demonstration by the writer, who has recently made a careful investigation of the operating conditions prevailing in a large number of motor installations, covering practically every class of business. These tests demonstrated, that in general, motors are not operating in excess of 75 percent of their normal rating, and in many cases at less than 50 percent, a condition of affairs ordinarily observable in earlier days with D. C. motors, but a practice which should not be followed in these days of economical studies.

In making these tests, investigation of the demand and resulting power factor developed at different times, and under all conditions of load, was carefully checked for the purpose of comparing results in operation where different parties were responsible for the installations, and the results showed that, in general, installations made under the advice of manufacturers' agents resulted in a power factor rarely exceeding 60 percent, and in one case fell below 35 percent in a single installation of 1400 h. p. of induction motors.

Similarly, installations made under the advice of central station sales agents showed average power factors of approximately 75 percent, which, while fairly satisfactory, might have been improved in many cases.

In comparison with the two results above noted, is placed the results obtained in several cases where the consumer was prevailed upon to accept the recommendations of the central station company's engineers regarding desirable equipment. In these cases the resulting power factor has varied between 80 and 85 percent. The fact that many of these undesirable installations are already equipped with motors before the central station interests have an opportunity to consider the installation for connection to their systems, places them very much at a disadvantage, and it frequently happens that the acceptance of an undesirable installation means the acceptance of a customer who is not profitable, and perhaps a loss to the central station company.

It is for these reasons that I repeat that the key to the situation generally lies with the engineers, whether those of the manufacturer or not, who are responsible for the specifications and layouts of motor drives in commercial service.

Low power factor is the cause of much trouble to central station companies, and the indifference or lack of knowledge of the importance of this phase of their service has led some of the larger companies to apply rigorous rules limiting to 90 per cent the lowest power factor which a customer's service may develop, leaving it optional whether he will install an equipment to meet that condition or go elsewhere for his service.

It would seem a better plan for the company to exercise advisory influence over each installation, in conjunction with the engineers or agents who are interested, and thereby accomplish satisfactory results without the application of a hard and fast rule.

It is the writer's opinion, developed after a long study of this subject, that it is possible in the majority of cases of commercial operation to obtain power factors of not less than 80 percent, a result that is well within reasonable limits for the central station, and requires no condenser equipment to correct.

We have considered earlier in this discussion the three conditions under which condensers are generally used.

In the first, that is, generating stations, the necessity for their use is generally the result of development of unsatisfactory conditions on customers' premises, which result in a low power factor beyond the capacity of the generating equipment, and the installation of a condenser for the purpose of enabling certain generators to continue to carry on the service can only be regarded as a makeshift to cover up poor engineering outside of the generating station. It often happens that a misconception of the requirements of a system results in ordering a generator based on operation at 100 percent power factor, when the simplest calculation of the conditions to be met would indicate that the generator should be bought for 80 or even 70 per cent power factor. A generator so purchased must in all cases be more economical than the addition of a synchronous condenser solely for the purpose of raising the power factor could possibly be, either from an investment or an operating point of view.

The requirements which invite the installation of a rotary condenser in sub-stations solely for the purpose of raising the power factor are usually identical with those just ascribed for generating stations, except that in this case the condenser is able to perform more valuable duties, in that its operation raises the capacity of both generating and transmission systems, thereby distributing its first cost and additional cost of operation over a larger initial investment.

In the third case, where synchronous condensers are installed on customers' premises, the rarity of installations of sufficient size as to warrant such a course makes their use under such circumstances rather limited. Where it is possible to use such apparatus the benefits are limited to improving the conditions of a single circuit, whereas the whole distributing system may be in need of correction, providing unsatisfactory motor equipments are in operation indiscriminately over the system.

The author has referred to installations of condensers on the premises of certain consumers for the purpose of improving power factor, and a brief inquiry would show that there are many similar cases on record. It would be of interest to know under what conditions these installations were made, that is, has the consumer actually bought the apparatus and operated it at his own expense in order to make his service conditions comply with some rule of the supply company, and thus cover up or compensate for conditions created by indifferent engineering on the part of his own organization? It is possible that the supply company finding itself unable to supply satisfactory service with existing service connections, has deemed it advisable to install and operate a condenser on the consumer's premises at its own expense, as the easiest way out of a dilemma.

In the last case it may reasonably be contended, that the act of a central station company in supplying service to a consumer when his business develops so low a power factor as to demand correction, requiring additional or extraordinary investment such as extra heavy line connections or possibly a condenser, really constitutes discrimination if such a consumer is charged the same rate as other similar consumers who do not make the same demands on the company's investment and operating costs.

Consider two consumers, identically located with regard to the supply company's distributing system, each with a demand of 100 kw. and with the same consumption of energy. One of these consumers operates at 95 percent P. F. and the other at the not uncommon P. F. of 50 percent.

The last consumer requires generating line and transforming equipment twice the capacity of the first, and incurs operating losses in like proportion. If we may assume that the 95 percent consumers' service is exclusively for lighting and the 50 percent consumers' for power, it is usually true that the power consumer obtains a lower rate per K. W. H. notwithstanding the heavy duty he demands from the distributing system. If in another comparison both should be power consumers, one using suitable synchronous motors with resulting high P. F. and the other underloaded induction motors at low P. F. similar conclusions as to discrimination may be drawn, if two such consumers are charged the same rate per K. W. H. Assuming that the low P. F. developed in one case was through no fault of the supply company and entirely due to the consumer's engineering, should the supply company install a condenser to correct such conditions without adequate compensation, the question of an equitable adjustment of rates becomes further complicated.

Compare an installation of underloaded A. C. motors developing low P. F. with a similar installation of underloaded D. C. motors, both of which are paying the same rate per K. W. H. In the first case the central station company in order to supply satisfactory service is forced to make an abnormal investment without proportional returns. The D. C. motors while running underloaded inflict no hardship on the supply company either in investment or operation, in fact, owing to their lower efficiency they actually increase the consumer's charges through the larger consumption of current for the work performed.

It is suggested that when a supply company considers the supply of service to a customer whose operating conditions are undesirable, in that they impose unusual conditions in order to receive satisfactory service, an additional charge should be made over and above the regular rates to cover such conditions and thus place all consumers on approximately the same investment basis for similar service capacities.

The author has suggested that the central station may appear to be more interested in P. F. than efficiency, but that

P. F. is really a secondary consideration. From the manufacturer's point of view this may be true as disregard of P. F. naturally leads to additional apparatus without necessarily increasing earnings.

From the central station point of view no more serious problem presents itself in the design and operation of an A. C. system in a manner satisfactory to its consumers, than the reduction of the component parts of the system to the simplest forms and the smallest possible number. Admitting that the synchronous condenser or other special apparatus is particularly adapted to and necessary in certain situations, the operating engineer still looks forward to a millennium when a large portion of the complicated equipment now employed in electric supply systems may be dispensed with and our customers served in practically the same manner as our one time rivals, the gas interests, serve theirs.

A great service can be rendered central station interests by the introduction of a line of synchronous motors of medium capacities, capable of performing the service now obtained from induction motors, thus opening the way to securing satisfied customers through lower rates as the result of the decreased investment required to supply their service.

THE PRESIDENT. Perhaps someone here has had some practical experience with operating synchronous apparatus. Mr. Richards, I think you have, have you not?

MR. E. J. RICHARDS.

I want to refer to paragraph 9 and to the importance of adopting sizes of motors to the loads that they carry. This was particularly called to our attention in the case of a factory on our lines where an installation of from 60 to 70 motors was made with an aggregate capacity of about 525 H. P.

The motors were badly underloaded with a resulting power factor for the installation of below .60.

The customer was induced to check up the loads on the individual motors, to change his motors around and to substitute motors of proper size, with the result that the total connected load was reduced to about 350 H. P. and the power factor brought up to .85 or better.

Regarding paragraph 15, I believe that a central station should not be too particular in requiring a customer to meet the ideal conditions. It is entirely proper to try and get the highest possible power factor, but in many cases the customer will want to allow for future growth or does not have the benefit of high class engineering advice, but he usually knows in a general way what class of apparatus will meet his conditions or his pocketbook and the central station should meet him half-way while offering advice and suggest the use of apparatus best suited to the customer's conditions, present and future, although something might have to be sacrificed in so doing.

In the town of Brattleboro, Vermont, we have a connected load of about 1,000 Kw. We supply a local lighting company, a street railway company and two or three manufacturing establishments. At this point one rotary converter is used, but its capacity is not large and the correction that we get from it is not great.

Coming down the line, we get to Gardner, Mass., where we supply the needs of the local lighting company for power and lighting, and at that point we have installed a motor generator set, using a synchronous motor, the fields of which were especially designed for the work, so that they can correct the power factor. The result is that at that sub-station we are able to carry a leading power factor of perhaps .95.

At Fitchburg, Mass., we supply a number of factories with a connected load of about 6,400 horsepower of induction motors, beside the load of the Fitchburg Gas & Electric Light Company, which we carry at times. The resulting power factor in that situation is about .75. At that point we have no means of correcting our power factor.

At Clinton, Mass., we supply a textile mill, which has a connected load of about 4,500 horsepower of induction motors. When their installation was made some nine or ten years ago, they adopted a 40 cycle system; the result was that we were obliged to install motor generator sets or frequently changers. In making that installation we installed two 1800-kilowatt machines, designed with especially heavy fields for the correction of power factor. From the Clinton sub-station we also supply the Marlboro Electric Company for their ordinary lighting and power load. By means of our synchronous apparatus at the Lancaster Mills we are able to carry a resultant power factor of unity, or a trifle better, in our Clinton sub-station.

At Worcester, Mass., we are carrying a total load of about 4,000 horsepower of induction motors in four or five different mills. In addition to that, we have a load of about 3,000 kilowatts which we deliver to the American Steel & Wire Company. Part of that load consists of an electric furnace, in which they have three large carbon electrodes in a retort which contains a charge of about ten tons of molten metal, and the refining process is brought about by raising the electrodes until arcs are produced on the surface of the molten steel. The power factor which resulted when that furnace was first started ran anywhere from .50 to .80 and the disturbance on our system was pretty severe. Our cables were overloaded, and the drops in voltage at the south works were excessive, and they were not able always to get their charge of steel put through in time. We induced them to install at that point a motor generator set especially designed for the work, controlled by a regulator, so that with the motor generator in service we are able to get a leading power factor as high as 60 and carry practically unity at that point when the furnace is in operation. In operating the furnaces it takes about an hour to an hour and a half to refine a charge of steel. The furnace is then off for about an hour or an hour and a half. At their north works they have about 1500 kilowatts in motor generators, which are also designed for the correction of power factor, so that at our Worcester sub-station we are able to secure at least unity, and sometimes a leading power factor, depending on the general conditions of the load.

About a year ago, when our loads began to increase at our generating station, we found that our average power factor ran in the neighborhod of .85, and by attention to the various pieces of synchronous apparatus on our line and by proper experimenting, we have been able to bring that power factor up to between .90 and .95.

The President. I would like to ask if there is anyone here from any of the plants that Mr. Mosman has spoken of in his paper. If there is, we would like to hear from him.

Mr. Elden in his discussion raised the question of discrimination, as to whether we were not discriminating against the customer who had a good power factor by charging the man with a low power factor the same price per kilowatt hour. I wonder if this is true. We elect for reasons well known to ourselves, for more flexibility in station apparatus, lines, line transmission, etc., to serve the customer with alternating current rather than direct. That being the case, have we any right to penalize him because he has a low power factor? Mr. Hayes, what is your opinion on that subject?

Mr. Hayes (Fitchburg.) I think the point which Mr. Elden has raised in reference to discriminating where the character of service is a factor is possibly well taken. We in Massachusetts have brought to our attention sometimes by the Commission, and have had under consideration otherwise, the difference, perhaps, between power and light. The two, of course, have always carried different rates. The nature of the lighting service being very much more expensive to handle, of course has always carried higher rates. The hours of use are shorter, and the hours during which a profit can be realized are of course very much shorter, than for power business. The investment required for handling a certain load of power will of course bring a greater return in profit, even though at a smaller rate, on account of longer hours. I think personally that it is going to be very difficult for the central station to go to a customer and say that the form of power which he is buying from us, it possibly being of a low power factor, is any different than that used by some other customer, who fortunately, perhaps, requires a form of power which may carry with it a high power factor.

I believe a customer may be most interested in energy that is the actual horsepower or kilowatts which he requires. To his mind this will be that for which he should pay. So personally I believe, Mr. President, that the customer's suggestion would be very strong that it is so much horsepower or so many kilowatts that he is buying, and that the central station should have a schedule of rates for that unit of power.

In connection with the paper which Mr. Mosman has given us, on page 8, paragraph 15, where he cites that it is better for the central station to face the situation by instantly raising the power factor of the system to an economical point, I believe in the smaller cities and towns the field is very much less than in the larger cities. I have taken the stand once or twice that it is possible to avoid, even with any system of rates, the acquisition of any undesirable business, by simply staying away from it. I don't believe business is going to come running to you without solicitation, and with this in mind I believe that if the smaller central stations are in need of business, and undoubtedly they all are, they must face the situation, take conditions somewhat as they find them and be prepared to make some profit on all the business in sight. This does not mean that good engineering should not prevail, and that suggestions should not be offered leading to improving the conditions at the customer's premises. I believe that every effort should be made to improve the conditions of load at the customer's premises, so that conditions will be as ideal for the central station and also for the customer as possible. In several instances I have had occasion in negotiating contracts to have the customer put up to us that we are trying to introduce too many restrictions.

I believe it is not well for at least the smaller central station to attempt to introduce too many restrictions in their contracts for I think it will keep business away. The same results can be attained by suggestion, engineering, and possibly the introduction of a synchronous condenser, if it is absolutely essential. I think, however, before the introduction of synchronous condensers for the purpose purely of improving power factor that engineering talent should be utilized, in order to thresh out and find out if every source of apparatus for improving power factor has been utilized.

In the case of water powers which are not always continuous, and sometimes auxiliary to steam plants there may be times when this apparatus could be well utilized during times of low water to improve power factors for at least part of the year, and possibly during the winter time and times of heavy load.

I am somewhat interested to inquire of the author of the paper if in Hartford and some of the other cases cited the central station company has gone to the expense of making the installations noted. In some cases a large machine, 200 K. V. A. or 500 K. V. A., is installed where only a small load exists, it would be interesting to know whether the customer or the central station has spent the money for this apparatus, or, on the other hand, whether the introduction of this apparatus on the part of the customer or the company has been a factor in naming a price for the service.

Mr. Boyden. There is no doubt but what it is an easy matter to determine the difference between the rate charged for light and power, but to say what the change is between power and power is another matter. I have in mind two customers on our service on the same rate, practically with the same installation, approximately 1,000 horsepower. In one case the power factor is at 35. The factory covers the entire site of land which they own, and we had no opportunity to install any condenser apparatus on their premises and were obliged to go back to our nearest sub-station and put in a 720 K. V. A. condenser. Our other customer gives us a load of approximately the same, with a power factor of 85, and I claim that he is the customer who is paying for this condenser. It is the customers with the high power factor, if there is any profit in it, that must pay for all the sub-apparatus that you add to your lines for them; and I believe that we have as much right to say what the rate shall be under the power factor as we have to say how much the voltage shall be, or how much current we will give on one side of a three-wire main.

Mr. Hayes. I would like to ask the last speaker if a similar case does not exist between a customer located say three miles from the power plant and one located 1000 feet. In the first case a very much larger investment is required than in the second. Is he able to charge a higher price?

The President. Mr. Boyden, will you answer that, please?

Mr. Boyden. That depends entirely upon what you may have in mind. But I am speaking now of large customers, customers of 50 kilowatts or more. With the smaller customers what the gentleman says of course will be true, you could not equip for the short distance customer at the same cost you could for the long one, or vice versa.

Mr. Campbell (New London.) I would like to take exception to a remark the Chair made, to the effect that in many cases we are using alternating current to suit our own convenience. I think, owing to the problems of distribution, that we are using the only system that is feasible, and that is not a matter of preference or to suit our own convenience, but is a matter of using the only system that is possible under the circumstances.

In reference to bringing up the power factor, in a company with which I am connected we have a power rate that gives the customer a better discount the larger his consumption is in proportion to his connected load. In our power schedule we frankly state that it is to our advantage to have the motors loaded, and being to our advantage we will give the customer the benefit of a lower rate or a higher discount if he will put in as small a motor as will do his work. In a number of cases we have been able to induce customers to change their motors from a large size to a smaller one, the customer getting the benefit of a lower rate and we getting the benefit of a better power factor.

The President. In reply to the point that Mr. Campbell raised, I would like to state that what I had in mind was companies who are operating both direct and alternating current apparatus. I fail to see, if the suppositions which Mr. Elden advanced were carried out, how we could discriminate against the alternating current man with the low power factor in place of the man who is being furnished the direct current, perhaps only a short distance away. Mr. Mosman, can you answer those questions that have been asked, please?

Mr. C. T. Mosman. I am not sure that I have clearly in mind all the questions that have been asked, but in reference to Mr. Elden's remarks it seems to me, although I know Mr. Elden does not mean it that way, that the manufacturers' agent is hit rather hard. No manufacturer's agent goes to a customer and intentionally sells him a motor twice as large as the work requires. He inquires concerning the conditions and gets the best line on the situation that he can; in return he gives the best advice of which he is capable. It would be very nice if one were able to size up all these situations exactly right and able to recommend exactly the right size motor, with the result that in every installation the motors will always be running at or near full load. Not many instances are met where such a result is possible. The motor must be sufficiently large to start the load; it must be sufficiently large to carry the peak loads. If the conditions of the work are such that the motor must run at half load a greater part of the time, in consequence of being large enough to meet the above requirements there is very little that can be done about it. In connection with textile mill work there is probably the greatest accumulation of concrete data enabling a selection of motors with ratings very close to the average work to be done, and in such installations the selection of motors is very carefully studied. In consequence, textile mills operate at power factors of .8 and upwards. This power factor will vary at different times in the day and at different times in the year, although the textile mill load would be considered a comparatively steady one.

The universal use of synchronous motors would from the power factor point of view be very fine. None of us would desire to use a synchronous condenser if it were possible to use a synchronous motor which would do useful work and at the same time perform the duties of a condenser. In this connection it is well to bear in mind that the synchronous motor costs more than the induction motor; it requires a higher class of labor to operate it; it requires excitation; it is capable of drawing from the line a very lagging current instead of one that is leading if the excitation is improperly adjusted, hence it is not wise to turn this type of machine over to the ordinary laborer as an operator. It is the small consumer whose load results in the lowest power factor, and the synchronous motor is not applicable to this business. In consequence I see very little hope of our arriving at the ideal condition outlined in Mr. Elden's discussion, but we will probably continue to improve in this respect year by year.

The point which seems to excite the greatest interest and which constitutes the principal question that I remember, is whether the consumer in the illustrations which I give paid for the synchronous condensers. In one of the instances cited he did,—that is, he paid a portion of the cost of the condenser; it is my understanding that he did not pay the entire expense. In this particular instance there was such a length of cable from the stepdown transformer through the customer's premises to his motors that by raising the power factor at the proper point by the use of the condenser he made sufficient saving in the cables to make the investment in the synchronous condenser worth while. He was further influenced in his decision by the fact that the regulation would be considerably better with the condenser than without it. In the other installations cited it is my belief that the central stations carried the entire expense and that they were led to make the investment on account of the expected improvement in operating conditions, and very particularly with reference to regulation. I think the above covers the points raised by the various questions asked.

I am not supposed to be so very much interested in the matter of rates, which was brought up in Mr. Elden's discussion, but I would like to say that in my opinion it is desirable to tend towards a simplification of rates rather than a complication, and it would require quite a complicated system to give an equable rate for every power factor as well as for every load factor, and the distance of consumer from the central station and all other such points that might with equal justice be considered. If all customers were very intelligent and broad minded they might be brought to understand such a system and accept it, with very happy results, but judging from the discussions which I have heard among my neighbors over such a relatively simple matter as the two-rate system of primary and secondary charges for lighting, and the opinions expressed by very intelligent business men that the whole arrangement is absolutely unfair, foolish, a nuisance, etc., and that the Commission ought in a high-handed manner to eradicate it immediately, I am convinced that the general public will be unfavorable to any further complication in systems of rates and might even welcome a simplification of rates, although such simplified rates were acknowledged to be less equable.

THE PRESIDENT. That covered what I had in mind, Mr. Mosman.

MR. BATES:—(Westinghouse Electric & Mfg. Co.) I as a representative of a large manufacturing company would be very glad to say a few words along the lines suggested by Mr. Mosman with reference to the installation of motors. I know that all of the large electrical manufacturing companies are educating their men; they are endeavoring to get a higher grade and type of men into the electrical work; and have spent a great deal of money in accumulating data with a view of putting the salesmen in a position to select motors which will be of the proper size with a view to co-operate with the central station in getting the proper size of motors on their lines so as to bring the power factor of the system as high as possible. I do not question but what Mr. Elden in his paper probably overlooked this fact. I am very glad to make this statement because I know the large companies are keeping this question of power factor in mind. It is a very essential thing from the standpoint of the central station and on the other hand from the standpoint of the manufacturer. We cannot afford to sell something which is going on to the central station line which in time will come back on us because we have sold something which from an engineering standpoint was not correct.

The President. It is very interesting, Mr. Bates.

The President. In this connection Mr. Holmes has a telegram which he will read here, which I think will be a matter of interest.

Mr. Holmes read the following telegram:

"Manchester, Vt., Sept. 28.

"Howard T. Sands, President,
"*National Electric Light Association.*

"The National Association of Cotton Manufacturers, holding at Equinox House its ninety-first meeting, extends to the National Electric Light Association cordial greetings as an expression of its obligations to the workers in electric lighting and transmission of power in improving the process of cotton manufacturing.

FRANKLIN W. HOBBS, *President.*
C. J. H. WOODBURY, *Secretary.*

The President. It seems to me we should take some action on that very cordial expression. I would be very glad to entertain any motion.

Mr. Boyden. Mr. President, I move that it be properly acknowledged by our President.

THE PRESIDENT. I would like to offer an amendment and make that the Secretary, Mr. Boyden. You have heard the motion as made and seconded; all those in favor will please say Aye.

(The motion was adopted.)

THE PRESIDENT. I am sorry, very sorry indeed, that the time is drawing near when we have got to close. This paper would admit of a whole lot more of discussion. Mr. Gidney's paper we will have the first thing in the morning.

I want to state that I am going to copy one more practice which President Campbell inaugurated last year, namely, of taking the supplies which will be furnished at the head table tonight and prorating them on your banquet bills. The banquet tickets will be taken up by the waiters and will be charged on your regular bill, and there will be a small amount charged extra. That represents what we have to furnish for our guests at the head table. If any member feels that that is unfair, however, I wish he would see me about it.

We will adjourn until tomorrow morning.

SECOND DAY

SEPTEMBER 29, 1911.

The convention reassembled at 10 A. M., President Sands presiding.

THE PRESIDENT. The first matter this morning will be the report of the Executive Committee on the President's address. Mr. Holmes.

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

Mr. Holmes read the report of the Committee on President's address, as follows:

"In Executive Committee.

"Voted, the Executive Committee approves the address of the President, with emphasis on the following points: that the

Association will do all in its power to co-operate with the Rate Committee, and that the Association devote twenty minutes to a discussion of the one or two convention plans."

The President. Gentlemen, you have heard the report of the Executive Committee.

(The report was accepted.)

The President· I am going to take the liberty of curbing that twenty minutes to possibly ten. The time is short; we have three excellent papers yet. What we desire to ascertain is the sentiment of the members present as to whether we should continue to hold two conventions or should limit it to one, and I would very much appreciate an expression from anyone here who has any views on that subject.

Mr. Smith, you have had some experience in this matter. What is your opinion?

Mr. Smith (Salem.) Mr. President, it seems to me that this is a very important matter, and as there are so few here now to discuss it I believe we should wait till we have a larger number here or else have this matter deferred until all members can express themselves. Knowing, as I do, the feeling in the older association that preceded this one, it seems to me that we want to look into that matter very carefully, so that we can be sure that we are not going to make a mistake. I should dislike to see anything done that would affect the organization unfavorably by not permitting the local members an opportunity to go to the convention, and if we have but one meeting a year, and that perhaps held in Boston, it is not going to allow the local members in the other states the opportunity that they ought to have. On the other hand, if the annual meeting is held in the other states, it is not going to permit the larger number of people that are in and around Boston an opportunity to get the advantage of meeting together. So it seems to me on the whole that we ought to look into this matter very carefully and allow all members an opportunity to express their opinions, and I hope that there will be a very free discussion of the whole matter.

THE PRESIDENT. In answer to what Mr. Smith has said, I would state that it is not the intention to take any final action at all today. The matter will be settled, undoubtedly, by a letter ballot. We thought, however, if the matter could be discussed here this morning that when the letter ballot was received it would be better understood, and all we were asking for this morning was the individual opinion of the members present.

Is there anyone else who has any views on the subject?

MR. HOLMES. Mr. President, it seems to me that one convention a year, and one good one, in a good place, with a good attendance and good smart papers and business, ought to be enough. You all see the number of conventions that are appearing before us. I won't try to name them all, but you have illuminating engineering, electric vehicles, and the national and our own, which are all taking time, which of course they ought to take, of the busy central station men. It seems to me that with this multiplicity of conventions it will be harder for the central stations to send a good and proper representation to all these different conventions, and particularly on that account I am in favor of the one convention a year for this Association.

THE PRESIDENT. I would be glad to hear from anybody else. I think there is something in what Mr. Holmes has said. I know some of us have either got to quit going to so many conventions or give up our jobs, one of the two.

If there is nothing further to be said on that, we will close the discussion.

Last night Secretary Martin made an announcement which I know we were all very glad to hear, namely, that Mr. Davidson, who formerly was with us and was at one time the President of your Association, has been honored by being elected President of the newly formed Northwestern Section of the

National Electric Light Association, comprising five of the northwestern states. It seems to me that it would be very fitting, and I know it would be very gratifying to Mr. Davidson, if this Association asembled should send him a message congratulating him upon his election, and I should be very glad indeed to entertain any motion looking to that end.

Mr. Barrows (Providence.) Mr. President, I move that a proper telegram be sent to Mr. Davidson in the west, expressing our congratulations.

(The motion was seconded and adopted.)

The President. One other matter before we get down to business. I referred last night to Miss Harriet Billings, and to the interest which she took in the work of the National Association in its early days. This morning our Secretary has handed me a letter which she received from Miss Billings, and which I am going to ask Mr. Holmes to read.

A LETTER FROM MISS BILLINGS.

Mr. Holmes read the following letter:

"The Orchard, Arlington, Vt., September 8.

"Miss O. A. Bursiel,
"Secretary New England Section, National Electric Light Association.

"My dear Miss Bursiel:

"Please present my sincere thanks to the officers and Executive Committee of the New England Section for their courtesy in inviting me to attend the coming convention at Bretton Woods.

"I heartily wish that I might accept but find it impossible to do so.

"It is a great pleasure to me to know that my boys who have grown up in the Association and now form families of their own still think of their mother.

"I sincerely hope, and am perfectly sure, that your convention will be most successful in every way. Please remember me to all my friends who may be present.

"Again thanking you, I remain,

"Very cordially yours,

Harriet Billings,
Assistant Secretary, National
Electric Light Association."

The President. Gentlemen, do you wish to take any action in regard to that letter? If not, the Secretary will place the same on file.

The first paper this morning is "The Development and Application of Electricity to Domestic Uses," by Mr. Walter H. Vorce.

THE DEVELOPMENT AND APPLICATION OF ELECTRICITY TO DOMESTIC USES.

BY

Walter H. Vorce,
Vermont Power and Manufacturing Co., St. Albans, Vt.

In accepting the honor conferred by your Secretary in requesting me to prepare a paper upon the subject that has just been announced, I little appreciated the magnitude and scope of such an apparently innocent title, or otherwise I should have considered it my duty to you, my fellow associates, to have declined the task in favor of some other member better qualified and more familiar with this intensely interesting and profitable line of electrical development, which, almost within the last decade, has grown from an infinitesimally small beginning until it has blossomed into a veritable field of golden opportunity for the average central station.

I approached my subject with considerable trepidation under the impression that my utmost efforts to enlighten you on this subject would have about the same effect as that produced by a notice of which the following is a literal translation, received by the consumers of electricity in Bangkok, Siam:

> "Sir:—For the case that your electric light should fail, we beg to send you enclosed post card, which please send us at once when you find your light out. The Company will then send you another post card."
>
> Yours truly,
>
> Manager of Siam Electricity Limited.

The early history of the domestic use of electricity is singularly lacking in any authentic records of definite achievement. As a matter of fact I think we can assume, without fear of contradiction, that until the commercial introduction of the alternating current generator, producing, as it did, large quantities of electrical energy cheaply, which it was possible to distribute over a large territory, comparatively little thought or ingenuity had been concentrated upon the production of electrical devices for general domestic use, and if we concur with the ideas recently expressed by Mr. Edison, this subject has not yet received the attention it really deserves, and the "home electrical" still affords rich opportunities for the genius of the youthful inventors of the coming generation.

While the manifestations of electricity were indefinitely known and occasionally recorded by the Ancients, undoubtedly the very first reference to our particular subject is the following quotation attributed to the world-famous Benjamin Franklin, who, as early as 1747, wrote:

> "A turkey is to be killed for our dinner by the electric shock and roasted before a fire kindled by the electric bottle, when the health of all famous electricians of England, Holland and Germany is to be drunk in electrified bumpers under a discharge of guns from an electric battery."

The achievement of these feats undoubtedly appeared little short of supernatural in that day and generation, but we question if even the brillant and far-sighted Franklin himself ever conceived the possibility of utilizing electricity for general domestic cooking and other household purposes.

Over a century and a half has elapsed since Franklin performed his famous experiments with his electrical kite and key,—a generation has lived and died since my fellow-stateman, Thomas Davenport, of Brandon, Vermont,—invented the first electric motor produced in this country, which, emerging from his humble blacksmith shop in all the crudeness of its original form, has been so marvelously perfected and developed, that it has become the principal factor in the utilization and transmission of one of Nature's most potent forces.

Scarcely two score years ago Professor Alexander Graham Bell exhibited the first model of his electric telephone to a doubting and skeptical public, yet even in this brief period of time the electric telephone of today is the most favorably known and commonly used electric device in existence, interconnecting practically every section of our broad land each with the other, enabling us to actually annihilate both time and space.

Today at the opening of the second decade of this twentieth century, we are watching with mingled feelings of awe and admiration the growth and development of many wonderful and stupendous undertakings, yet to my own mind, the most marvelous achievement that deserves more consideration than it is usually accorded is the installation and operation of the gigantic units used exclusively for the generation of electrical energy in the mammoth power plants of our public utility corporations, aggregating in one instance the grand total of six hundred thousand horse power, which is divided, subdivided and distributed to thousands upon tens-of-thousands of homes and industrial establishments, summoned and directed more readily than the Genii of the wonderful lamp of Aladdin, to lighten the burdens and relieve the arduous labors of the modern housewife.

The early stages of the development and introduction of many electric devices were attended by many failures and much crude experimenting was conducted at the expense of an enterprising public and while the fundamental principles were simple in the extreme, the business was obscured by such incomprehensive terminology that it could not be readily understood. Even to the experienced the many forms in which electricity manifested its usefulness seemed wonderful, to the average layman the results were truly marvelous.

Some twenty years ago, when the primitive electric motor was just gaining the attention of the public, a few electrically heated flat irons and cooking devices first made their appearance; but these devices were far from satisfactory and about as short lived as some of the companies that manufactured them. We can verily believe, however, that if during this formative period there had been a more general use of electricity, undoubtedly a different history might have been written. I have about come to the conclusion that my little girl expressed the real truth while sitting on my lap recently facing a large mirror. After gazing very intently at her reflection for several minutes she looked at me and said, "Papa, did God make you?" "Certainly, my dear," I told her. "And did He make me too?"—taking another look in the mirror. "Why certainly," I replied, "what makes you ask?" "Oh, I don't know. Seems to me He's doing better work lately."

Upon the advent of the Central Station in the smaller cities and communities and the extension of their lines of distribution over a continually expanding territory, a virgin field, big with possibilities for the multifarious application of electrically operated devices, both for the convenience and the necessities of every-day existence, confronted the central station managers, who, in conjunction with the manufacturers of electrical apparatus, have eagerly grasped the opportunity presented and by systematic and persistent exploitation and education have been successful in adding millions to the annual revenue of their respective companies.

I have inferred that to the limited use of electricity was due the tardy introduction of suitable electric devices, but there were two other deterring factors which were equally, if not more directly, responsible for the result. One was the prejudice fostered by the unsatisfactory life of the apparatus manufactured in the early stages of the art; the other was the excessive rate charged by most central stations, which at first largely deterred the use of electricity for general heating or in any culinary devices. Within the past two or three years, however, all of the original objections have been most happily overcome, and while wonderful strides have been made in a comparatively short period of time, we have but scratched the surface of this new field of opportunity, but the seeds that have been sown have germinated and are beginning to bear fruit, ultimately to produce an ever-increasing and profitable harvest.

While the number of present day electric devices, available for domestic purposes, is almost legion, they may primarily be divided into two general classes.

> 1st. Devices designed to utilize the heat developed by the resistance of a suitable element to the passage of an electric current. These are most commonly used for general heating and culinary uses.

These may be sub-divided into:
- a. Lamp socket devices
- b. Heating circuit devices

> 2nd. Mechanically operated apparatus in which electrical energy is converted into mechanical motion by means of a suitable electric motor. These are usually termed motor-driven appliances.

These may be sub-divided into:
- a. Necessities
- b. Conveniences

The domestic line of electrically heated devices is really of two widely different types.

1st. Appliances designed for general heating purposes requiring for their operation comparatively large quantities of electrical energy, which to be operated successfully must be connected to a special heating circuit.

2nd. Devices so constructed as to concentrate the heat evolved within or on the surface of some suitable utensil for some specific domestic purpose. Most of these appliances can be connected to the ordinary lamp socket and have become daily necessities.

It has been found that the average cost of operation of devices for general heating purposes has been more or less prohibitive, and consequently restricted the use of this class of heaters to special cases, where convenience and comfort are the prime requisites, and the first cost of the apparatus as well as the expense of operation are of secondary consideration.

Where the climate is comparatively mild or the local conditions extremely favorable, the use of air heaters or "luminous radiators" has met with considerable favor, though this does not indicate by any means that we have yet been successful in heating houses completely by electricity, as so far we have been unable to reduce the cost to a point where it will in general compare favorably with other methods commonly in vogue.

The writer has in mind the case of one of our consumers, who discovered that the heat radiated in a small bathroom from an ordinary electric toaster was sufficient to raise the temperature to a comfortable point within a reasonable time, and proved to be the most convenient, as well as the most economical method of producing this particular result, although I might add that we have been unable to interest this same consumer in the purchase of a "luminous radiator" for more general use. We were able to secure another prospective customer who was assured that if he would install our service and purchase an electric flat iron for his wife it could also be used as a small electric stove—provided his wife did not object—which would also serve, in the absence of any better means, to heat water for shaving purposes. In this case it is hardly necessary to aver that the results obtained have made both supremely happy and they have never questioned the amount of their bills, which, as a matter of fact have never been excessive.

The most inviting field for the central station manager in recent years has been that offered by electric cooking in which, at the present time, everything considered, electricity has no compeer.

Time was when the preparation and cooking of food was esteemed an art. Today by all progressive minds cooking is conceded to be not only an art, but a science—what it really should be. From the cook's point of view the heat must be under immediate and absolute control, it must be concentrated at the point where it will produce the quickest and best results, must be perfectly safe and absolutely free from any odors that might contaminate the food.

Electrically heated utensils meet all these ideals in every particular and really leave little, if anything, to be desired. The recent improvements and developments in the apparatus together with the decrease in first cost and the low rates offered by the most progressive central stations are all bringing electricity into common everyday use, both in the kitchen and in the dining room.

The coal range was a decided improvement over the old wood-burning stove, in so far as the heat generated was more regular and could be maintained more readily at a fixed degree of intensity, but coal produced a residue of ashes and soot, coal is dirty and heavy to handle; oil, when used as a fuel, often emits smoke and soot as well as a disagreeable odor; gas has many desirable features, but it often imparts an unsavory taste to certain classes of food, while both oil and gas, unless intelligently handled, increase the hazard of fire and explosion.

Even in the homes of our childhood days it did not seem so essential to consider the question—ever present today—of the comfort and convenience of the cook,—most of the cooking was done by servants who accepted the difficulties and discomforts as inseparable with their occupation, but now practically all the best of our servant class have been well-educated or probably read the "Ladies' Home Journal" and now exact the very best of accommodations and conveniences. Then too, kitchens were large rooms with plenty of ventilation, not likely to become intolerably hot; modern conditions, however, are materially different especially in the larger cities. In the desire to economize space, the kitchen in most modern apartments has been reduced in size until it is hardly more than a generous closet. To many apartment dwellers servants are out of the question and the cooking for the family must be done by the wife or daughter, and occasionally the breakfast has to be prepared quickly by the "old man" himself.

In the smaller communities, where the number of homes is steadily increasing, the number of available servants is actually decreasing. These conditions are not improving by any means—quite the reverse is true—they are actually becoming more aggravated.

The servant question is fairly exemplified by the experience of a young matron, who, being disposed to magnify the consequence of her household, often told her friends that she usually had three cooks, and the statement was accepted until one of her neighbors discovered that the trio consisted of one coming, one in the kitchen and one going.

The conditions that have just been cited have gradually created a demand for electric cooking devices, which seems to be one of the most practical solutions of our domestic problems, and many Central Station Managers have profited and are continuing to reap the benefits of this service which it has been possible to render at a comparatively small outlay, and but slight increase in operating expenses.

It might be said that electric devices are not cheap either in first cost or in expense of operation. This in a measure was too true, but the present cost is not prohibitive and when intelligently directed the outlay for current need not be great—hardly more than for gas at average prices—but their attraction lies not in any actual economy that their use may accomplish,—but in the fact that they make cooking really clean, cool, comfortable and so dainty that practically all of the operations may be carried on in the dining room itself. This pre-eminent feature is particularly appreciated by the householder who is obliged to prepare all of the meals herself, as the food can be served on the table with the least possible effort.

While one may do almost ideal light-housekeeping with a few of the most useful utensils, if it is desired to do all of the cooking required by the average family, a complete outfit including some form of oven is absolutely essential. With the present standardized outfits that are now being offered by some of the manufacturers it is quite possible to produce results that cannot even be approached by any other method, by anyone who is capable of combining the necessary ingredients in the proper manner, the cooking itself is actually determined by the clock and is no longer a matter of guess work or uncertainty.

As far back as 1897 Professor John Price Jackson perfected and recorded the results of a series of practical experiments in cooking by electricity and demonstrated that it was possible to produce excellently cooked food although the expense involved with electricity at ten cents per K.W.H. was considerably greater than that of producing substantially the same results with ordinary fuel. A summary of the results obtained as compiled by Professor Jackson is given in brief below:

DESCRIPTION	K.W.H.	PRICE.
Average family breakfast	1.36	.136
" " dinner	2.98	.298
" " supper	.839	.084
* " cost per meal		.131
Baking 4 pies simultaneously	.62	.062
" 2 large loaves of bread	1.22	.122

(*Does not include the cost of heating water for washing dishes.)

It is interesting to note that the housekeeper in charge of these experiments keenly appreciated the merits of cooking by electricity in spite of the lack of perfection of the apparatus, as she is quoted as saying, "We were able to cook more rapidly, to maintain the heat at just the right point and could readily prevent over-cooking or under-cooking. While we were using electricity every dish was perfect."

Just ten years later in 1907 Mr. J. R. Cravath, a well known consulting engineer of Chicago, published in the "Electrical World" the results of the experiences of his family in cooking by electricity extending over a period of thirty days, which owing to unusual conditions, could not be termed representative, but for the purpose of comparison the record of an average week is tabulated below:

K.W.H. per day	4.06
Number of regular meals	18.
Average No. persons per meal	4.
K.W.H. per meal	1.52
Maximum demand	2.KW
Load factor	9.5%

During the period from 1900-1910 the use of electric cooking has become quite common and in fact a number of large installations have proved eminently successful demonstrating the commercial as well as the domestic possibilities of the art. The most notable example is the plant of the Natural Food Company of Niagara Falls manufacturing "Triscuit", a cracker of shredded wheat toasted on both sides simultaneously. This installation required a total of ten thousand electric stoves, twenty-five hundred of these stoves connected up in the form of a link belt constituting one machine. These machines were operated continuously and produced seventeen thousand five hundred "Triscuits" per hour.

There has been a marked improvement in the design and durability of electric cooking devices made in the past two or three years, so that now practically all of the manufacturers are guaranteeing their apparatus for two or even three years, thereby removing one of the principal obstacles which impeded the sale of even the most popular forms of domestic appliances.

A more recent obstacle to the really successful installation of the larger heating and cooking devices has proved to be the inadequate carrying capacity of the interior wiring of most residences, and in many instances the extra expense of the necessary extra wiring added to the first cost of the electric range or other apparatus has caused even those that were favorably inclined towards a more general use of electricity, to defer the adoption of the innovation until a more convenient season.

This difficulty has been and is being overcome in a measure by a process of education and the co-operation on the part of the central station manager with architects and contractors, in an effort to secure the installation of heating and power circuits in new residences and apartment houses.

In no one particular is the wasteful character of the American people exemplified more than in the use of fuel for cooking purposes, but the recent agitation regarding the conservation of our fuel supply and the increased cost of living has forcibly pointed out the necessity of providing means of utilizing more and wasting less of the heat units which Dame Nature in former times so generously stored up for us, or that are now being placed to our credit on a less magnanimous scale. "Necessity, the mother of invention," has focused the attention of many of our central station men and many eminent engineers on this all-important problem with the result that a "fireless", or as I prefer to term it, a high efficiency cooker has been developed, heated by electrical energy, which bids fair to revolutionize the present methods of cooking, producing at the same time better and more healthful food.

That we are lagging behind Germany, for instance, in this portion of the culinary art may be inferred from the fact that one manufactory in the Kaiser's realm produced and sold last year over fifty thousand cookers built on the so-called fireless principle, and this factory is but one of a score, nearly, if not, as large. In Germany, for instance, the ordinary type of "fireless cooker" is nearly, if not quite, as common in the home as the refrigerator is in this country, and we are credibly informed is successfully used in the preparation of a very large percentage of the food cooked in the German household.

We have all become quite familiar with the economy and superior quality of the high efficiency Tungsten filament lamps as compared to the old carbon filament lamps, but I do not think we all appreciate the importance to the central station interests of the results it is possible to obtain with the latest type of high efficiency cookers. From my limited experience, which is borne out by several engineers eminently well qualified to express an opinion, it will be possible to reduce the cost of cooking by electricity to a point where it will become the most satisfactory as well as the most economical method known to domestic science—that is wherever electrical energy is continuously available—indeed, if I may venture to make a prediction, it will be a combination of the high efficiency cooker heated by electricity, together with a few other popular forms of electrically heated devices, that will do a large percentage of the cooking for the coming generation.

The success obtained thus far with the experimental high efficiency cookers justifies the statement that a new epoch in the more general use of electricity is at hand;—that the day of successful competition with coal, oil, gas and other fuels is actually dawning;—that electricity may be used in the kitchen of families of even moderate circumstances and can be maintained at a profit to the central stations;—that the average householder may enjoy all the delights and advantages of electricity in the preparation of food at little or no increase in expense over the present crude and wasteful processes;—it means sóoner or later a reduction in the cost of living, in the use of the less expensive cuts of meat and also a saving in space, which will in the average apartment insure more comfortable quarters.

The principal benefit to be derived by the central station is the extremely small maximum demand and the use of current for practically twenty-four hours per day by each residence consumer, resulting in an ideal load factor.

In order to popularize this service and put it upon a basis that will compare favorably with the cost of ordinary methods of producing practically the same results the net rate cannot exceed two cents per K.W.H. and would prove profitable at less.

Believing that there may be some among you who are unfamiliar with the present development of the electric high efficiency cooker, and that those who have closely followed the experiments in this field would be interested in having some of their own conclusions confirmed or disproved, I will describe briefly some results obtained with an ordinary commercial "fireless cooker" having three compartments, the center one being twelve inches in diameter and fourteen inches deep and the only one equipped with an electrically heated element, one of which is attached to the top and the other to the bottom, each absorbing fifty watts and so connected that they could be used separately or simultaneously.

The result of several tests demonstrated that with an input of approximately 100 watts it is possible to produce and maintain a temperature of about 400 degrees Fahrenheit, which proved to be sufficient for ordinary roasting or baking, while with an input of approximately 50 watts a temperature of 240 degrees Fahrenheit was readily maintained and when continued for a longer time produced results with certain food than the higher temperature for a short period.

Owing to the comparatively small amount of current required for the operation of the cooker it can be readily attached to any lamp socket, thus obviating the necessity of the installation of a special heating circuit, and as the cooker was mounted on rollers it was possible to move it to the most convenient point of operation or to disconnect and store it under the kitchen table, so that it was entirely out of the way when not in use. It was also equipped with an electric time-switch which was used principally for cutting off the current at a predetermined hour for food which was to be cooked over night.

With this outfit, a toaster and a six-inch stove, all of the cooking for a family of four was successfully accomplished, with a minimum effort and at an expenditure of 9.6 K.W.H. for all of the meals prepared for six days. The bill of fare was varied and a liberal supply of excellent food was supplied at each repast. The water used for washing dishes, however, was not heated by electricity.

It may be interesting to compare the results which were obtained by the high efficiency cooker with those presented earlier in this paper, and therefore I have tabulated some of the data obtained from an average of a number of experiments given in the following table:

OPERATION	TIME REQUIRED	K.W.H. USED
Baking two loaves of bread	60 min.	.1
Baking one batch biscuit	50 "	.083
Baking two pies	60 "	.1
Baking ten potatoes	180 "	.3
Baking chocolate layer cake (3 layers)	50 "	.083
Baking sponge cake	50 "	.083
Baking six custards	50 "	.083
Boiling potatoes	150 "	.125
Roasting five pounds beef	160 "	.267
Roasting 4¾ pounds lamb	120 "	.2
*Boiling large ham	120 "	.2
*Boiling oatmeal	120 "	.2
*Boiling corned beef	120 "	.2

(*Last three items were left in cooker all night, current being turned off by time switch after being on two hours.)

Although some failures and disappointments were anticipated, uniformly successful results were obtained throughout the tests, but on account of the comparatively small space available for cooking, it was found that careful and systematic planning was essential to a varied bill of fare. To sum up briefly, it strikes me that if some practical genius would invent a comparatively inexpensive electrically operated dish-washing machine that could be supplied with water from a continuous electric hot water heater I am convinced that the question of the general adoption of the new method of cooking by electricity in connection with the electric dish-washing machine would be largely a question of "delivering the goods."

I have dwelt at considerable length on the use of electrically heated devices, as it seemed to me that they have received the most prominent attention within the last two or three years, but the motor-driven household appliances are becoming more and more popular, and while they do not individually, as a rule, earn as great a revenue for the Central Station, they serve to popularize electricity and certainly merit a fair share of our consideration.

It is only within comparatively a few years that the wonderful adaptability of electrical power to lighten the drudgery of the domestic work of the household has been properly appreciated by the manufacturers of electric devices, although the central station manager has, at considerable expense, been faithfully introducing all meritorious devices that would advertise all of the desirable features of electric service.

Recently there has existed a happy awakening, and the list is now replete with unique and useful appliances available for all those who can afford to use current for lighting purposes.

The introduction of the electric fan and sewing machine motor have led the way for the vacuum cleaner, the meat chopper, the motor-driven ice cream freezer and crusher. We have also the electrically-driven washing machine and wringer, together with the motor-driven mangle to dispel the horrors of "blue Monday," with the larger electric fans for drying clothes on rainy days. For the manifold requirements of the kitchen there are now available the motor-driven coffee, meat and vegetable grinders, egg and cream beaters, knife sharpeners, polishing and buffing wheels, potato peelers, cake and dough mixers, butter churns and fruit presses. Many of these devices may be grouped about a single motor, which, through the medium of a flexible shaft, permits of the use of one or more utensils at the same time, constituting literally an automatic kitchen.

For the boudoir we have vibrators, massage machines, electric combs and hair dryers, in fact, there seems to be practically no limit to the originality that may be displayed in making a little motor useful about the home. This is especially true since the advent of the compact, light-weight, drawn-shell type of motor, that has recently been substituted for the heavy, expensive and generally inefficient fractional horse power motors formerly in production.

It would not be befitting to leave our subject without including a timely reference to the motor-driven vehicle, which, in spite of their many undesirable features and cost of maintenance, have found a unique place in many homes of the well-to-do class, and are becoming an extremely common sight on the streets of our larger communities. While they have their limitations, they have proved to be an ideal vehicle for the "lady of the house" or the "man of business," combining in the superlative degree both safety and convenience, with the reliability of the mythical "one-horse shay."

I firmly believe in the tremendous possibilities of the domestic application of electrical energy, especially the more extensive use of electricity in the preparation and cooking of food, but the record of achievement and scientific development rests largely with us as pioneers in our own individual communities, and in a broader sense as members of the National Electric Light Association, yet I am sure you will pardon my presumption if I leave you with a word of caution regarding this subject. The present trend of development is along radically different lines and with the business still in its infancy we must not attempt too rapid progress or expect too much, or we are quite likely to find ourselves in the same unfortunate position as little Willie, whose father brought him home a chameleon for a pet and explained to him that a chameleon is supposed to take his color temporarily from the color of the object he may be on, so Willie placed the chameleon on a bright green carpet and it turned green, he then put it on a red cloak and it turned red, finally, however, he carelessly laid it on a plaid shawl, and the poor thing busted itself trying to make good.

I have implicit faith, however, in the ability of my associates, and I believe that the history of the next ten years will redound to our credit and show even greater progress than has been recorded in the last half century.

THE PRESIDENT. Mr. Vorce's paper is now open for discussion, and I hope we can have a free but prompt discussion of this most interesting subject. I am going to ask Mr. West if he won't favor us with his ideas on it.

MR. WEST. Mr. President: I have been very much interested in the different devices which Mr. Vorce has brought to our attention, and there is another device for which I think there is a large field,—that is, the domestic refrigerator. The amount of current that it consumes is very small, and the cost of operation to the average family should not be prohibitive. It seems to me that the sale of these devices will depend largely upon their convenience for use, and that it would be a good idea for the central station management to be sure, in the wiring of new homes and apartment houses, that convenient outlets are provided, especially in the dining-rooms and bed-rooms, to accommodate a number of electrical appliances.

MR. GIBBS, (Boston.) Mr. President, perhaps there are some of you who have not heard or known about The House of Edison Light which the Boston Edison Company has had in operation since the first of last December (1910.)

Nowhere else in the world has there ever before been seen a house like "The House of Edison Light," which has been erected in Newton Centre, at the corner of Centre and Pleasant Streets, by The Edison Electric Illuminating Company of Boston. This House is open every business day from 2 P. M. until 10 P. M. No one should miss the opportunity to see the attractive, modern and economical features of this Electric home.

The House of Edison Light is, as its name implies, an electric house. It is a chimneyless house. It represents the height of electric development in domestic life. From the door bell, which rings by current from the electric lighting mains, through the hall, with its dim as well as brilliant lighting, the living room, with its comforts for happy evenings after busy business days, the dining room, with its economical luxuries, within the reach of everyone who has electric service in the home, the chamber, that is a model of comfort and attractiveness, the kitchen, with its complete electrical equipment, the pantry, with its plate warmers and other practical conveniences, the laundry with electric washing machine and conveniences for electric ironing, out through to the garage, which holds an electric vehicle and many electric conveniences so necessary to the autoist's uses—the House is a marvel of complete and efficient economy.

The House stands a little back from the street with attractive approaches. At the front is a pergola 8 ft. by 10 ft. in size. The major portion of the house is 34 ft. square, which provides for five spacious rooms within, 14 ft. by 14 ft. in size. In addition to the rooms already mentioned there is a reception room in the centre of the cottage which makes a fitting entrance for the many guests who will be welcomed there.

This House is by no means a "freak." It is a portable house, built by a well known firm in Dover, and transported from the factory on electric trucks to the place of its first location in Winchester. The electric wiring was installed in the sections of this House as it was being put together, so that when the Edison Electric Illuminating Company moved the House a few weeks ago from Winchester to Newton, the transfer was made easily and quickly. After the House was put together it was completely furnished with handsome and luxurious furniture in keeping with the surroundings. The excellent taste that has been shown in selecting the finishings and the furnishings would make this residence a most attractive place, even if there were not the additional features of the electric service.

Few of the appliances that have been installed in the home, and the methods by which electric service will be used, are unique or especially novel; most of them have been in practical use for years—the value of this House as a place of investigation for present and prospective householders lies in the fact that all of the various applications of electric service, and the appliances are collected here so they can be studied, and their economy discovered in connection with other things. Most people know that electric fans are good, not only to cool the heat of a room in the summer, but to distribute the warm air from the radiators in winter, but a great many have never tried the two ways of making an electric fan useful. Most people know that toast made on an electric toaster is the best that can be obtained, and is sweeter and crisper than can be made in any other way, but many people have yet to eat their first piece of electrically made toast. Many people know that vacuum cleaners, vibrators, polishing machines and knife sharpeners can be operated in the home electrically and with great convenience, but many have yet to have practical experience with these things. Most people know that an electric curling iron heater can be always available in the dressing room or chamber for the continual comfort and convenience of the hostess or her guests, but many ladies have yet to enjoy curling their hair with electrically heated curling irons. Most people know the wonderful comfort, safety and convenience of the electric heating pad. It never leaks, will maintain a constant temperature and can be kept at the head of the bed, available for any emergency. A sudden attack of neuralgia, or any illness, even "cold feet," can be corrected promptly and effectively by simply putting the heating pad against the spot where it will do the most good and turning on the current.

All of these things are brought into one delightful display in The House of Edison Light, and their combined comforts will make those who visit the home happy in the thought that the electric day, as well as electric night, is at hand.

Competent demonstrators show the practical application and economies of all the electric appliances, and other attendants do everything for the complete comfort of visitors.

The results we have found have been satisfactory. We were carrying on an auxiliary campaign for flatirons, making a special price on them, and also did some special work with electric toasters in Winchester, and we hope this winter to carry on a series of special campaigns in Newton and vicinity with the house as a centre and as a distributing point. Orders are taken there for appliances that people become interested in.

MR. HOLBROOK. I have heard and read this paper of Mr. Vorce's with a great deal of interest. We all know that cooking and heating devices of every kind and description are available, and, at the present time, are as near perfect as the manufacturers can make them. Why therefore, are the electrical appliance not more generally used? If they are desirable, and as satisfactory as it appears to be on the surface, why is it necessary to attempt to make them necessities when they are merely luxuries? In other words, Mr. Gibbs has spoken of the Boston Edison Company's electric house. There are hundreds of devices in this electric house that the average person can't by any human possibility use. If they were used they would produce practically no results to the central station. Therefore, why should the central station exploit devices which produce little or no revenue and are beyond the means and needs of the average person? The entire development of the sale of electrical devices and the putting of same actually into service is attended first with unlimited effort on the part of the central stations, and second with a tremendous expense. Apparently the devices at present on the market are good, that is, they are well made, they are inexpensive, but for some reason or other they don't take, and I want to know why it is that so much effort is directed to their sale.

I was talking with the manager at Altoona where they have made a special effort to put out flatirons. They have over 3,000 flatirons in service. They have a Tuesday peak which makes it necessary for them at times, to operate a special unit so they can take care of their electric flatirons. This seems to me ridiculous. They have made superhuman efforts to get 3,000 flatirons in service, at an expense of $4.50 each for solicitation, delivery and collection of account and the revenue averages 40c a month for each flatiron. If it takes $4.50 to get a flatiron in service, why does it? Why, if the flatiron is a satisfactory proposition, doesn't it sell itself?

I was talking with the manager at Williamsport, which company made a deal with a manufacturer to put out flatirons. They paid the manufacturer a certain price for flatirons with the understanding that those flatirons would be put in service. When they finished the campaign, they found that it had cost them an equal amount to get the flatirons in service as the flatirons themselves cost; it cost the manufacturers as much to put the flatirons out as they had received for the flatirons. Both companies would have been as well off had they given the flatirons to the customers. Why is that?

If the coffee percolator is necessary in the house why doesn't everybody who can afford to buy one use an electric coffee percolator? Why is it necessary for the light company to make so much talk and effort to get that coffee percolator in service? It surely is not a money maker for the central station with its high maximum demand and its limited use. The toaster is a good thing but does it benefit either the company or the customer, sufficient in extent to justify the effort which is being made to exploit its sale?

MR. WHITAKER (Portsmouth, N. H.) I feel interested in what Mr. Holbrook has said, and will attempt to answer one or two of his questions. In the first place, the central station manager is not really looking for a profit on every piece of apparatus he puts out; that is, I mean on the sale of it, we don't make any profit on that usually. I know we don't make anything at home; when we get it out we are usually stuck for part of it. I believe that any piece of apparatus that we can put into a home, or a store, or any place that uses current, is an advertisement and is an asset of the business. It is making our service universal and necessary to the public; it is making it attractive. We put out vacuum cleaners, and we put out coffee percolators, and we put out toasters and all those things; they don't amount to anything for current, not a thing. The flatiron from a current consuming standpoint is a good thing, but most of this apparatus that we put out really amounts to nothing except to make our service really necessary, something that the gas man can't give them. That is about the size of it, and that is really, I think, the whole answer to Mr. Holbrook's question of why everybody doesn't use them. We can't get them to, and it doesn't pay to go out and work too hard in getting out devices that won't bring in any money; and still we try to advertise them and put them in simply to make our central station service not only a convenience but a necessity to the public. That is what we are in business for.

Mr. Ball (Haverhill.) I have also listened to Mr. Holbrook's remarks with a great deal of interest, and it seems to me, speaking of a number of the appliances and why they are so hard to introduce into a home; outside of possibly the flatiron and the toaster, which are nominal in price, the first cost of any of these devices, such as the percolator or the chafing dish or any of the smaller cooking devices, is pretty heavy, and the ordinary householder does not feel, I think, that they can afford to purchase them. It seems to me that outside of those things that I have mentioned what we have got to get is a more moderate priced article from the manufacturers.

One other thing. In Mr. Vorce's paper he says that the cost of electricity per k. w. h. should not exceed two cents per k. w. h. to compete favorably with other methods of cooking and heating. It may be that where they have water power they can very easily give a rate of two cents per k. w. h., but the question in my mind is, taking luminous radiators, for instance, if you have a customer who for a few months in the year has a small office where he would like to use a luminous radiator how are you going to give him a rate for a short term, unless you can charge him the primary rate which in my town is twelve cents? The matter of taking on that particular business for say four months a year, or five months, is a pretty hard one to work out. I agree that if we could get a rate of two cents a k. w. h. and think that it was profitable to furnish electricity at that rate, we could easily get a lot more business. I would like to ask also how many places there are where they give a rate of two cents per k. w. h., or less, for that particular class of business?

Dr. Bell (Boston.) I have listened with a good deal of interest to a discussion of this paper, because the subject is one which is going to have every year more and more vital interest to the central stations. The questions which have been asked as to why it has not arrived now are, I think, extremely pertinent. The last speaker has put to the front one which is unquestionably uppermost, and that is the cost of the devices. Some of them are cheap, others are not; but if one undertook to equip with a degree of completeness which would mean considerable benefit to the central station in the matter of load he would find that the total cost of first equipment and of maintenance would run rather high. That cuts out a large class of customers who are profitable customers on light.

But another thing, which is more easily reached, is a campaign of education, to teach people not that these things exist but how to use them, and that need is peculiarly true of the cooking devices. I have a warm friend who is a manufacturer of such things, and when the fireless cooker came out he immediately had a happy thought that this at last was the solution of the difficulty that has been alluded to in the paper, so inasmuch as the staff around his office were accustomed to have their lunches cooked in the factory, he started in and got one of the fireless cookers and equipped it, and they all concluded they would have some corned beef. They put the fireless cooker to work strictly as per instructions, heated it up by their electrical coils, and after giving it more than the time required on the face of the returns as presented by the fireless cooker manufacturer, they went joyfully out to lunch at one o'clock, and I am credibly informed that that corned beef, cooked by the fireless cooker, ate very much like a piece of old raw-hide gear. Then they tried it all the afternoon, and the next day took it out of the fireless cooker and attempted to eat it, again with the same result. Then they boiled it in the ordinary way. The fact is that a good many of these appliances require some knack, and knack is the hardest thing you can confer in an educational way upon anybody. The presiding geniuses of most kitchens do not have it, and if one attempted to put out promiscuously these electrical cooking appliances the results would only be attained by use of "gumption." I think that a campaign of education, teaching people not only that these things are here and that they are tremendously convenient, and useful, but how the things can be worked without excessive cost and to produce the best results, would do good. There is where the house of Edison Light, which Mr. Gibbs has referred to, is trying to do something effective, showing people how easily these devices can be worked, what can be done with them, how the heat can best be brought up and taken off again.

The same thing is true of gas. When the gas people began to put out their domestic appliances everybody laughed at them, because they did not understand them, did not know how to use them. Now they have tumbled to the fact that when you once get a kettle boiling over a gas heater you can turn down the gas to a very low point and the kettle will continue boiling, just the same in the economical use of electricity. When that economical use is taught, even at fairly remunerative prices of current, far above two cents, I believe there is going to be a very considerable use of such apparatus, but it is a case of pounding away and educating the customer.

The President. I am very sorry to have to close the discussion on this paper; it is so interesting I know we should carry it on with profit for some time longer, but unfortunately the time is short. I think that the crux of the whole thing is education. Lower cost is desirable, but one thing will be absolutely necessary to get that lower cost, and that will be a larger production. In the meantime we have got to help bear the burden.

Our next paper is "The National Electric Light Association System of Accounting as Applied to Small Plants," by Mr. Herbert A. Gidney.

THE NATIONAL ELECTRIC LIGHT ASSOCIATION SYSTEM OF ACCOUNTING AS APPLIED TO SMALL PLANTS.

BY

HERBERT A. GIDNEY
Auditor Malden Electric Company.

THE STANDARD CLASSIFICATION OF CONSTRUCTION AND OPERATING ACCOUNTS for Electric Light & Power Companies, as adopted by the National Electric Light Association, is the result of no little effort on the part of the leading accountants of the Association. It is the work of men experienced in the affairs of large, as well as of small Companies. In drawing up a standard classification of accounts for Electric Corporations to be used throughout the United States, it is very essential that the system be drawn up on broad lines in order that it may be adapted to the needs of all Electric Companies, large and small. That the Standard System of Accounts fills this requirement there is no question. To be sure it is necessary perhaps to add certain temporary or special accounts to take care of some special condition, and then too, some Companies will have no use just at this time for certain accounts which cover phases of the business which have not as yet been taken up. It is not intended, I am sure, that the Standard System of Accounts shall be used in its entirety if local conditions do not warrant it, but that the system be adopted as the basis of your accounting system.

That this was the intention of the Committee on a Uniform System of Accounting, who are responsible for the Classification of Accounts as adopted, is clear from their letter, dated May 5th, 1910, which accompanied their report. With your permission, I will quote a part of that letter which has a direct bearing on this point, in which they say:—

> "Your Committee does not recommend that the full classification of Expense Accounts be adopted by every Company; on the contrary it would be extremely cumbersome, and in fact unnecessary, for a small Company to attempt such an elaborate scheme of accounts. The Committee, however, does recommend and it urges the adoption of the eight (8) main divisions by *all* Companies, and for two reasons:—
>
> 1. That Uniform or Standardized Accounts control the cost of operation.
>
> 2. That comparisons of cost may be made with other Companies having a similar standard classification of accounts.
>
> There are so many circumstances and conditions involved, in the further sub-division of the eight main divisions, that your Committee is inclined to recommend, that the Companies themselves determine what further refinements of the accounts are desirable. Some Companies may wish to separate 'Operations' from 'Maintenance.' Others will want to know the cost of fuel, which is the main element in the expense of production; and others will desire fuller information relative to the cost of distribution, and so on, until finally the particular needs of the several Companies would cover the full classification.
>
> Your Committee, therefore, submits the full classification of accounts with the recommendation that each Company adopt the eight main divisions, and in addition, such sub-divisions as will best suit their requirements."

If you find it necessary to open up special accounts, treat them as sub-accounts to one or more of the regular accounts prescribed. If your plant is a small one, and you do not find the need for certain detail accounts, then combine two or more accounts relating to the same class of property or work. It is essential, of course, that the main divisions be maintained and that they represent exactly that which is described in the detail accounts. So much depends upon a good system of accounts that all members who have not yet adopted the standard system should do so without further delay, and it is for the purpose of urging the adoption of the standard system by Companies who have not already done so, that I am bringing the subject before the members of the New England Section. I trust that the points outlined in this paper, together with the general discussion of the subject which I hope will follow, will tend to have a favorable influence on members who have not yet adopted the standard system.

It is surprising how quickly a real live organization will become familiar with a system of accounts, providing that some one in authority takes the trouble to devote a part of his time, at the outset, in explaining the accounts so that the men may have a full understanding of how necessary the information is for the proper conduct of the Company's affairs. Employees whose duties are confined to a certain part of the work should not be called upon to become familiar with the entire system of accounts, but should have placed in their hands a complete description of such accounts as they will use in their work.

It is very desirable that a code of numbers be adopted for the accounts and that the men be asked to become familiar with these numbers and use them in place of the names of the accounts. I have found from experience that it is not long before the numbers become very familiar to the men and mean as much to them as the names. With proper supervision on the part of the office, any error made in the use of a number will be easily detected. There are several schemes for numbering the accounts, but as yet, I am not aware that the Association has adopted any definite numbers for their accounts.

In a system of accounts with which I am familiar, there has been adopted a code of numbers, the principle of which has been as follows:—

Asset Accounts begin with 1, Liability Accounts with 2, Revenue Accounts with 3, Expense Accounts with 4; all temporary monthly or Apportionment Accounts begin with

5. In a combination Gas and Electric Company, straight Gas accounts will have the prefix "G", straight Electric accounts will have the prefix "E"; accounts covering both Gas and Electric Departments will have no prefix. In this code you will notice that there are one hundred numbers to each of the four principal classification of accounts. In the case of Production accounts for example, both operation and maintenance, all of the accounts could be included in the first thirty numbers, so that the station men will know at once that the Production Expense accounts are 401 to 430 inclusive. In this way, Station Wages might be assigned the number 401, Fuel-405, Water-407, Lubricants-409, and Station Supplies & Expenses-411. We have purposely omitted some of the consecutive numbers in order to provide for cases where it is found desirable to insert more detailed accounts.

By definitely assigning a series of numbers to the various divisions of the accounts, the work of memorizing the numbers is facilitated to a great extent. I will not attempt to describe any further at this time this code of numbers, but will gladly furnish further information to any member desiring it.

Once adopted, you will find the Standard System of Accounts one of the most useful records that you have. In a very short time you will find little or no difficulty in knowing just what account certain labor or material should be charged to. It will no longer be necessary for the Manager to appropriate all the invoices and time sheets, as many are now probably doing. You will find that the Standard System of Accounts will furnish you with facts about your business which were never before brought to your attention.

Drawn up in comparative form, covering both month and period, stated in dollars and cents, and cost per K. W. Hour, you will have in condensed form each month a statement from which you can learn exactly how you stand in respect to results and how they were obtained.

It is just as essential for the Manager of a small plant to have before him each month a summarized statement of the cost of operation for the month and period in comparative form, as it is for the Executive Officers of a large organization.

The financial statement (if properly drawn up) contains a record of the results obtained and enables you to see at a glance just how you stand. The statement should be studied most carefully as it will not only enable you to detect any unusual expenditures which can readily be eliminated in the future, but it will also show you just what business is most desirable, so that you may bend your efforts towards securing that class of business. By reviewing once a month the results obtained, the Manager and other officers who are responsible for the operation of the plant can keep better informed as to the financial condition of the Company.

If your methods are standard, you are in a better position to make comparisons with other Companies operating under similar conditions. Then too, it simplifies to a great extent the making out of financial reports to Public Service Commissions.

The Standard System of Accounts will be found very useful as a basis of your classification of subjects for correspondence and filing. If you will take the main divisions of the Asset, Liability, Expense and Revenue Accounts for your main subjects, with the possible addition of two special subjects to cover matters relating to Instructions and Organization, you will have a condensed classification of main subjects which will cover every possible feature of your business. The main subjects will be followed by the sub-account covering the particular subject. If desired, the subject can be further qualified by stating the particular project. To illustrate:— We will assume that a Company, having a generating plant, contemplates the installation of some automatic stokers. The first letter written on the matter would be given the subject "Boiler Plant—New—(Automatic Stokers)." All letters following, relating to this subject, would be assigned that subject. The Filing Clerk, upon receiving the copies of the letters to be filed, would immediately know that such matters were to be filed in the folder "Boiler Plant" under the general heading "Generating Plant—Steam."

Conditions and opinions vary so in the numerous Companies comprising the New England Section, that I will make no attempt to draw up a condensed summary of accounts. Your National Accounting Committee has given this most careful consideration and have concluded that it is inadvisable to attempt to prescribe a fixed summary of accounts which could be used by all member Companies. The summary of accounts which they have submitted in their published report is sufficiently flexible to meet the requirements of any organization.

In adopting a classification of construction and equipment accounts it will probably not be necessary to use all of the accounts prescribed, but only those which cover property owned by the Company, the cost of which the Company desires to have a separate record. It is so much easier to separate the costs at the outset than at some later date, that it is better not to consolidate property accounts except possibly in respect to some account or accounts covering some property of which the Company has acquired but little, as in the case of certain equipment for which special accounts are provided.

It is very important and necessary that an accurate record be kept of the cost of additional property installed. In the case of structures and machinery where many items of labor and material, etc., go to make up the cost, it is recommended that a number be assigned to each project of any importance. All labor and material, etc., should then be charged to that number until the completion of the work. If it is desired to know the cost of any particular part of the project sub-numbers should be used. It is customary to prepare an estimate of the cost of the work in which not only the cost is given but also the purpose of the work.

This is a convenient way of submitting recommendations for new work to the officers or directors of the Company.

If any property is to be replaced by the work, a description of the property to be replaced should be described in the estimate, giving the book value (estimated if not known) less salvage value. The expenditures charged to these temporary construction numbers are carried in a special account which may be designated as "Unfinished Construction." Upon completion of the work, a summary is made of the actual cost of each project, and submitted for approval to the proper officials. Upon being approved the total cost is then transferred to the regular account or accounts, so that you then have only one item appearing in the regular account covering cost of that particular installation.

It is very important these days that a Company have accurate records covering cost and description of property installed, not only for the use of the officers of the Company, but for the purpose of getting the necessary authority from the State Commissioners, having general supervision of the Company, to issue capital stock, bonds and other funded debt. By using estimate or authorization sheets, the number of entries to construction and equipment accounts is reduced to a minimum and it is, therefore, a very easy matter to prepare each month a summary of the increases to the property accounts. It is very much better to make this report each month, as at that time, the matter is more familiar in the minds of the men having the work in charge. This is of some importance in case it is found that the records supplied the office are incomplete in any respect. Construction costs should be based on accurate records. The practice of relying on the memory and judgment of the foreman or superintendent in charge of the work is not a good one. Unless some method (such as above outlined) is adopted, it is possible to obtain the cost of the various projects only by estimating.

The summary of Expense Accounts may seem to some to be unnecessarily long, but, if you will take into consideration that the classification includes accounts for every phase of the business, and will simply exclude those accounts for which you have no need, you will undoubtedly have left a condensed classification which will be found practical in every respect. I might submit a condensed summary of expenses accounts for small plants which would be theoretically practical, but I feel that the representatives of each Company, with a full knowledge of the conditions and requirements, are better qualified to select the accounts contained in the standard system which will best furnish them information regarding their operations.

Many of the points which I have outlined to you are no doubt being practised by some of you. It is to those who are still using the old methods, which do not seem to be giving them the desired results, that I am addressing my remarks particularly. I hope that all present who are in any way interested in this subject of Standard System of Accounts, will give the others the benefit of their experience, particularly those who are using the Standard System and find it to be satisfactory.

In conclusion, let me repeat that the Standard Classification of Accounts should be adopted without further delay by every member Company in the New England Section for the following reasons:—

1. The Standard Classification of Accounts is sound in principle and practical in scope.

2. It has been tried out by a large number of Companies throughout the United States and been found to meet their requirements satisfactorily.

3. By its adoption you will be able to make intelligent comparison with results obtained by other Companies using the standard system.

4. As members of the New England Section of the National Electric Light Association, it is our duty and pleasure to carry out the policies of the Association in so far as they meet our requirements.

The President. Gentlemen, this paper is now open for discussion.

Mr. Barrows (Providence.) Mr. President, the system of accounts as outlined by this very excellent paper seems to meet the requirements for which it was created, namely, in the first place an accurate record of existing conditions. It would be interesting to know how many of the members of the New England Section are using this system of accounts. The importance of correct accounting is being brought to our attention more and more these days, when the eye of the public is directed critically towards public service corporations, and when the municipalities and governments are investigating and requiring reports and figures on general lines and details. The fact that an accurate and true record of conditions is of prime importance to the management of a company is perhaps brought out by the fact that the head of one of the leading accounting firms in this country said recently that, taking the commercial reports of failures covering a period of years, it was found on analyzing these failures that over 75 per cent. of the failures occurred because these different corporations or firms actually did not know whether they were conducting their business at a profit or not. From such a system as outlined, it is easy for a management to report to the various commissions and to the municipalities, and to make such reports to the public as may be needed from time to time, and the need and the policy of making such reports appear to be growing.

The Electrical industry has grown in the past years more rapidly in the line of production and business management than it has in the accounting line. This might be said of a number of other, the large majority of businesses in this country. Of late years, however, more attention is being given to proper and strict system of recording the state of the business at various times. This system seems to lend itself very well to an Association of this kind, on account of its elasticity. The larger companies have more sub-accounts; some of the smaller companies naturally can get along, perhaps, with hardly any, and some with only such as their individual needs require. In this connection, the entries should be so made and the papers of original entry so filed that in case certain detailed information is asked for on some subject which is not represented by an account or a sub-division of some account, it can readily be obtained by referring to the original papers. The meat of these accounts, as far as the management is concerned, lies naturally in the kilowatt hour averages, and their use in comparisons from time to time with your own company and with other companies. The importance of comparing periods as well as single months is great, as it often happens—almost always does happen—that there are certain unusual expenses in one month which throw the comparisons out. In going over periods of a number of months, the trend of business is more clearly brought out.

In the matter of extension estimates spoken of in this paper I want to say just a word about the handling of this subject in my own company. We follow the same system as outlined, but perhaps carry it a little further. All additions to plant and property are assigned a number, and an accurate record of the cost of the work is kept, later it is closed out into the proper property accounts. When extensions to lines are needed or asked for the sales department canvass the territory in which the extension is proposed and estimate the probable income; the operating department then make an estimate of the cost. When the two are brought together the management passes on the extension. Its cost is accurately kept, and at the end of a year, it is checked up to see whether the estimated income which was made by the selling department has been verified. By doing this on all extensions the ability of the department to forecast somewhat more accurately the probable income of these extensions is increased.

I might say just one word about the value and necessity of reaching results quickly. This has been much improved and cheapened by the introduction of modern accounting machinery. We have quite a large number of additions in this line in our office, including adding machines, electrically driven, calculating machines, addressograph, folding machines and sealing machine for envelopes. Any of these we shall be very glad to show and explain at any time. After all, much depends on the personnel of your office force, and it is very important to have a loyal one, who take pride in their work, and also who believe in team work and carry it out in their work.

The President. This matter of accounting is one of the matters to which the Association has given importance in the most recent years. It is rather unfortunate that thus far we have had comparatively few men directly interested in the accounting end of our business attending these conventions. I had hoped that two or three other men whom I knew would be interested in this paper and be glad to discuss it would have been with us today, but unfortunately they were unable to get here. I simply want to add a word of personal testimoney to what Mr. Gidney has said, and will state that I think I am safe in saying that today I can make an intelligent analysis of the monthly report of any one of our companies in less than one-half the time that it took me before we adopted the standard system of accounts. I feel that there is many a small plant that is today doing what I once did. We worked along through the year, hoping that we were going to come out all right. If we did we patted ourselves on the back; if we did not we wondered why it was, and when we found it out it was probably too late to correct it. The central station industry today has attained a growth where it is necessary for the active, up-to-date plant manager to wait not longer than thirty days to find out where he is at and find out, if there is a screw loose somewhere, where he can tighten that up before the next thirty days has elapsed. The National Association are urging upon the newly created public service commissions in the various states the adoption of the N. E. L. A. system of accounts, and I hope that any of you who are doing business in any of these states where these new commissions have been created will welcome any suggestion on their part looking towards the adoption of this system of accounting.

Our next paper is The Wire Type Tungsten Lamp, by Mr. B. W. Fisher.

THE WIRE TYPE TUNGSTEN LAMP.

By B. W. Fisher, Jr., Westinghouse Lamp Co.

Before going into the description of the Wire Type Tungsten lamp, it will be well to briefly describe "Tungsten," how it is found and the condition in which the lamp manufacturer receives it.

Tungsten is one of the elements, that is, it is capable of being separated into its own molecular form the same as lead, silver, iron or any of the other elements. Its chemical symbol is W. Its color is from a steel gray to black, depending upon the manner of its reduction and the percentage of oxide present. The specific gravity of Tungsten is given from 17.9 to 18.2, but I believe from more recent developments that the specific gravity of the densest Tungsten is slightly above either of these figures.

Tungsten is never found pure in the native state; it is usually found as an oxide in connection with other metals. Its principal ores are Wolframite Fe WO4 and Sheelite Ca WO4. These ores are the oxide of iron and the oxide of calcium combined with the trioxide of Tungsten. The ores are crystalline and Tungsten is never found natively in anything but a crystalline state. The ore is crushed and then concentrated on a wilfley table to separate the gang from the oxides thus forming concentrates.

These concentrates contain about 70% of tungstic acid and are crudely purified to about 90% tungstic acid, which is a yellowish green or a brownish yellow mass dependent on the ore from which it was obtained.

The lamp manufacturer receives his tungsten in the form of this crude tungstic acid and by elaborate and complicated chemical processes purifies and refines it until it reaches the state desired for making a paste.

By one of the principal processes used, this paste is forced through diamond dies and the filament is formed by electrical treatment whereby all foreign matter is burned out of the paste and the particles of tungsten are sintered together into a continuous wire of pure tungsten.

Other processes of manufacturing tungsten filaments have been developed, but all processes necessarily start with the crude tungstic acid and end with pure tungsten. One of the recent developments has been the obtaining of pure tungsten which is ductile when cold, but as I understand metallurgy, the property of ductility is not natural with tungsten when cold and when heated to high temperature, tungsten wire which has been made ductile, will immediately start to crystallize back or change to its natural state and become brittle when cold.

The characteristics of the two forms of tungsten filament—the formed or sintered filament and the ductile filament—are of marked interest, and from what has been published on the subject, we gather that the ductile filament has an enormous initial tensile strength, which follows the law of all metals, in that the smaller the size wire the greater the tensile strength per square inch.

In a table recently published, the tensile strengths are given as follows:—

DIAMETER OF FILAMENT	TENSILE STRENGTH PER SQUARE INCH
0.00290	451,000 pounds per square inch
0.00207	499,000 " " " "
0.00153	547,000 " " " "
0.00118	737,000 " " " "

These strengths are, of course, the strength of the filament before it is placed in the lamp.

In the same publication this statement is made:—

> "The drawn tungsten wire as used in lamps has a very high initial tensile strength, but the metal does not retain this enormous strength after a few hours' operation."

This statement naturally aroused curiosity and to satisfy myself I procured in the open market a large number of tungsten filament lamps made up with drawn wire filament, and had these lamps opened and tested. It was found that the filaments were 0.00140 in diameter, and that in the lamps which were opened before being burned, the tensile strength of the filaments varied from 86,000 to 106,000 pounds per square inch. And in the lamps which had been burned 400 hours and then opened the strength of the filament varied from 24,000 to 57,000 pounds per square inch. This change in the strength of the filament naturally aroused interest, and some tungsten filament lamps containing the sintered or formed filament were procured, the filaments were found to be 0.00160 in diameter with a minimum tensile strength of 75,000 pounds and a maximum strength of 95,000 pounds per square inch, and in lamps which were opened after burning 400 hours the filament had a minimum tensile strength of 34,000 pounds and a maximum strength of 42,600 pounds per square inch.

If the strength per square inch of finished filament varies with these slight differences when the lamps are new and after burning 400 hours, then the absolute difference in strength of filament made by either process of 0.00160 or 0.00140 inches in diameter could hardly be considered a difference and is negligible.

It will therefore be noted that filaments obtained by either the sintering process or the drawing process are of approximately the same tensile strength when the lamps are ready for shipment, and the only difference is in the manner in which they retain their strength, which is slightly in favor of the sintered filament in percentage and uniformity.

The appearance of the filaments is slightly different in that the formed filament has a bright steel color with a matt surface, whereas the drawn filament has a slightly darker color with a smooth surface.

The electrical characteristics as to resistance both hot and cold, are, I believe, approximately the same, and the ability to withstand high temperature is the same.

Tungsten has a very low specific resistance so that it is necessary to use extremely fine filaments of great length in order to get the necessary high resistance. To place these long lengths of filament in a bulb, it must be in several loops, each loop supported at the upper and lower ends because tungsten though very hard and brittle when cold becomes plastic when heated, though when cold it is a very hard abrasive metal. It is therefore necessary for tungsten filaments to be supported in the lamp in a different manner from the old carbon filament.

These characteristics and the inability to obtain tungsten in long lengths made it necessary to make lamps with the filament in several hairpin loops which were joined in series at the open ends of the loops by V anchors or other metal conductors, the filament being connected to the anchors by melting globules of the anchor metal around the end of the filament. This made a very rigid method of support without flexibility and always constituted a weak point in the lamp. The importance of the development which led to procuring long lengths of tungsten filament can, therefore, not be over estimated, as it permitted a design which eliminated rigid joints and made possible the design of today which we know as the "WIRE TYPE."

The Wire Type lamp is one using a tungsten filament which is in one continuous length from leading in wire to leading in wire, the filament being wound on supporting anchors so it is free to move within these anchors and is connected to the leading in wires by flexible joints.

To insure positive electrical contact it is necessary that the joint between the filament and the leading in wires be rigid and to obtain flexibility in the Wire Type lamp the rigidity of the joint is overcome by wrapping the filament around the leading in wire in back of the joint, thus obtaining the flexibility of a coiled spring.

These lamps are a wonderful improvement over the former fused type lamps, as the use of this invention protects the fragile filament, permitting it to move freely in the anchors and yet take up all vibration of the filament while retaining the electrical advantages of the rigid joint.

The wonderful improvement in these lamps is shown by the methods used in packing where the old corrugated strawboard climax, used for years in packing carbon lamps, is the only protection necessary, excepting an outer layer of hay or straw between the lamps and the box, forming a cushion against the assaults of our careful freight and express handlers.

We are all familiar with the usual method of packing tungsten lamps, where the lamp itself was wrapped in cotton felt and this package inserted in a cardboard carton, and these tied together, and then the package of cartons packed in an outside container, protected by excelsior, straw, or other packing devices. The method of packing now used on wire type lamps is to place the lamp in a tube, as we know it. That is the climax, the corrugated paper climax, with a paper covering. Tie the packages of these climaxes together, and the only protection necessary is an outer layer of excelsior or straw between the lamps and the box, forming a cushion. Now, this cushion is to guard against jarring or misuse, which the lamps are very frequently subjected to by our very careful freight and express handlers, and in packing lamps in that way they have been shipped all over the country with virtually no breakage.

That reversal of their published statement was due to the fact that we had not tried out wire type lamps to a conclusion in trolley car service.

That test consisted in having a movable table, with a set of springs on it and a toggle joint in between. They connected the toggle joint to a motor, and as the eccentric of the motor moved the toggle joint past the centre the springs immediately shifted the table with a 5-8 inch throw, the table striking against rubber buffer blocks. The test is sufficiently severe to break down any rubber that they could get for buffer blocks, and to cause every socket they have tried to fail, but at the end of 400,000 shocks the filaments in the lamps had not failed.

Mechanical breakage will never be entirely eliminated, because you can break glass, and the question is to get the filament so that it will stand as much as the glass.

Other indications of the ruggedness of the lamps are the classes of use in which they are giving good service. A year ago the Street Railway Journal reversed a statement which they had published to the effect that the manufacturer recommended Wire Type lamps for trolley car service, and today there are several large urban and interurban railway systems which are obtaining remarkable results from their experimental installations,—one road having made a large experimental installation which has been in continuous operation for over three months with very satisfactory results,—another road having a very small installation of but thirty lamps on single truck cars for thirty days without a single loss.

A large steam road in testing 60-volt lamps subjected twelve Wire Type lamps to 400,000 shocks on a vibrating test without the loss of a lamp.

The lamps being sufficiently rugged to withstand all of the ordinary abuse incident to use, they can be depended upon for any class of service and as the mechanical breakage has been reduced they can be made the cheapest lamp to use, no matter what their cost.

The lack of accurate information as to the cost of incandescent lamp renewals has always impressed the writer and he regrets to have to admit that his knowledge of the subject is apparently as limited as that of the lamp user, but we have been accumulating data to see if this vague subject could not be made clear in a simple manner.

We have taken as our foundation the fact that the most efficient lamp, no matter what its cost, can be made the cheapest lamp for lamp renewals without considering the cost for current, provided it were operated at an efficiency sufficiently low.

If we were to take a 60-watt carbon lamp costing 15c, on the $1600 contract basis, which has a life of 700 hours at 2.97 w.p.c. and compare this lamp with the 40-watt Wire Type Tungsten lamp costing $ .504 on the $1600 contract basis, which has a life of 1000 hours at 1.23 w.p.c. we would normally say that the 40-watt Wire Type lamp is the more expensive for renewals and dismiss the subject; but all incandescent lamps follow a fixed law, in that decreasing the efficiency increases the life. To make this 40-watt Wire Type lamp and the 60-watt Carbon lamp cost the same for renewals, the only thing necessary is to reduce the efficiency of the Wire Type lamp to such a point that the life of the Wire Type lamp divided into its cost equals the life of the Carbon lamp divided into its cost, which in this case would be 2352 hours' life for the Wire Type lamp as compared with 700 hours' life for the carbon lamp.

This 2352 hours' life for the Wire Type lamps can be obtained by decreasing its efficiency from 1.23 to 1.41 w.p.c. which can be done by decreasing the voltage 7%, under which condition the lamp would give 25.4 c.p. and consume 35.8 watts so that it can be seen that the highest efficiency lamp can be operated so that it will give a life of ample length to compete with the lower efficiency lamp even though the difference in cost is material. In addition to which the highest efficiency lamps will give more light for the same or less energy consumed.

I had hoped to be able to show that relation in a lantern slide, where we plot the value of the carbon lamps and metallized filament lamps on the slide in horizontal lines, and bring down through those lines the life of the tungsten lamp at its different watts per candle, showing at what point the tungsten lamp would equal the carbon lamp in renewal cost without regard to the current consumed.

The above will show that with energy costing nothing, the most efficient lamp can be made the lamp of least cost for renewals, and similarly if we were to add to the cost of lamps the cost of energy, we would find that the most efficient lamp is also the most economical lamp. By the "most economical lamp" is meant the lamp which will produce the greatest candle power for a fixed sum, or will produce the same candle power for less money.

As lamps are manufactured today, the efficiencies are based on the two elements involved in their operation—the relative cost of renewals without regard to the current consumed as one element, and the relative cost of energy consumed per candle power without regard to the cost of renewals as the other element, and by adding these elements we obtain a set of curves showing what we term the most economical efficiency of an incandescent lamp. From these curves and a knowledge of the manner in which the costs for energy (that is rates) naturally divide themselves, we obtain the efficiencies which are best suited for commercial service.

These efficiencies have to include the cost of energy because the ultimate consumer is vitally interested in his bill for energy consumed. They also must take into consideration the cost of renewals because the central station must take into consideration this item in its annual cost. The lamp manufacturers have established efficiencies which approach the most economical lamp for cost of energy in excess of 5c per kilowatt, also the efficiencies which approach the most economical lamp for cost of energy from 2c to 5c per kilowatt, and the efficiencies which approach the most economical lamp for cost of energy below 2c per kilowatt. This provides suitable renewals for virtually any condition under which lamps are used, and let us see how it affects the absolute cost of renewals.

Basing all figures on the discounts applying on the $1600 contract and the period of time as 1000 hours, we have the following table as the cost of lamp renewals, and the cost of energy consumed at 1c per k.w.h.

Those efficiencies are established on what we know as the three voltage label, which while on the carbon lamp the high operating efficiency is economical with cost of current as low as one cent a kilowatt hour and on the metallized filament lamp the high operating efficiency is economical with cost as low as two cents a kilowatt hour. The tungsten filament lamp is economical with cost of current as low as four cents a kilowatt hour. On the first two lamps the difference in operating costs between the most economical efficiency and actual efficiency with cost of current five cents a kilowatt hour, is so little that it can be neglected, but the increase in cost on tungsten below four cents per kilowatt hour becomes sufficient to compel us to take it into consideration, so that we will make the division at five, two and below two cents per kilowatt hour.

CARBON FILAMENT LAMPS

Rating Total Watts	Net Price	Operating Efficiency	Actual Watts Consumed	Average Life	Cost of Lamps per 1000 Hours	Cost of Energy Consumed per 1000 Hours at 1c per Kw.
25	$ .15	High	25.0	500	.30	.25
		Medium	24.1	725	.207	.241
		Low	23.2	1000	.15	.232
30	.15	High	30.0	1050	.143	.30
		Medium	28.9	1500	.10	.289
		Low	27.8	2100	.0714	.278
50	.15	High	50.	700	.214	.50
		Medium	48.2	1000	.15	.482
		Low	46.4	1500	.10	.464

Rating Total Watts	Net Price	Operating Efficiency	Actual Watts Consumed	Average Life	Cost of Lamps per 1000 Hours	Cost of Energy Consumed per 1000 Hours at 1c per Kw.
60	.15	High	60.	700	.214	.60
		Medium	57.8	1000	.15	.578
		Low	55.7	1500	.10	.557
100	.225	High	100.	600	.378	1.00
		Medium	96.4	850	.265	.964
		Low	92.9	1350	.1667	.929
120	.225	High	120.	600	.378	1.20
		Medium	115.8	850	.265	1.158
		Low	111.4	1350	.1667	1.114

METALLIZED FILAMENT LAMPS

40	$ .168	High	40.	600	.28	.40
		Medium	38.7	900	.1865	.387
		Low	37.3	1300	.1292	.373
50	.168	High	50.	700	.24	.50
		Medium	48.4	1000	.168	.484
		Low	46.7	1500	.112	.467
60	.168	High	60.	700	.24	.600
		Medium	58.0	1000	.168	.580
		Low	56.0	1500	.112	.560
80	.28	High	80.	700	.40	.800
		Medium	77.4	1000	.28	.774
		Low	74.6	1500	.1866	.746
100	.28	High	100.0	650	.431	1.00
		Medium	96.7	950	.295	.967
		Low	93.2	1400	.20	.932

TUNGSTEN FILAMENT LAMPS

Rating Total Watts	Net Price	Operating Efficiency	Actual Watts Consumed	Average Life	Cost of Lamps per 1000 Hours	Cost of Energy Consumed per 1000 Hours at 1c per Kw.
25	$ .468	High	25.0	1000	.468	.250
		Medium	24.2	1300	.36	.242
		Low	23.4	1700	.275	.234
40	.504	High	40.0	1000	.504	.400
		Medium	38.9	1300	.388	.389
		Low	37.8	1700	.297	.378
60	.72	High	60.0	1000	.72	.600
		Medium	58.2	1300	.554	.582
		Low	56.5	1700	.424	.565
100	.972	High	100.0	1000	.972	1.00
		Medium	97.0	1300	.748	.970
		Low	94.2	1700	.572	.942
150	1.44	High	150.0	1000	1.44	1.50
		Medium	145.5	1300	1.108	1.455
		Low	141.2	1700	.847	1.412
250	1.98	High	250.0	1000	1.98	2.50
		Medium	242.0	1300	1.522	2.42
		Low	235.0	1700	1.165	2.35
400	3.60	High	400.0	1000	3.60	4.00
		Medium	387.	1300	2.77	3.87
		Low	376.	1700	2.118	3.76
500	3.96	High	500.	1000	3.96	5.00
		Medium	484.	1300	3.05	4.84
		Low	470.	1700	2.33	4.70

From the table you will note that the rental cost of lamps, take it in that way, per thousand hours is virtually 50 per cent. at low efficiency what it is at high efficiency. You will also note that the value of the current consumed at one cent per kilowatt at low efficiency is always materially less than the value of the current consumed at high efficiency.

From the above tables of renewal costs for lamps when operated at commercial efficiencies, you can get the relative cost of lamps and the cost of energy consumed per 1000 hours. It is a simple matter to find the cost of lamps and energy to produce a given amount of light, but as the horizontal candle power does not indicate the total flux of light emitted from a lamp, we have based the following tables on a given number of lumen hours because the lumen is a moasure of total flux of light, and therefore indicates the relative value of light sources for illuminating purposes, which is the purpose for which lamps are used.

By comparing the preceding tables with the following tables, it is a simple matter to ascertain what any lamp will cost the central station or the ultimate consumer per thousand hours; what the energy consumed by any lamp per thousand hour will cost at any rate per kilowatt, by simply multiplying the cost of energy consumed per thousand hours at 1c per kilowatt by the rate in question.

Similarly, if it is desired to furnish any given quantity of light, the total lumens required can be readily calculated and the cost of lamp renewals and energy consumed, obtained from the following tables.

These latter tables are of more importance to the lamp user than they are to the central station, but they furnish a guide for the central station to follow in determining on the lamp to use and in making their recommendations.

Basing all figures on the discounts applying on the $1600 contract and the total quantity of light to be furnished as 200,000 lumen hours, the following tables give the number of lamps necessary to furnish 200,000 lumen hours assuming that each lamp burns the average hours' life and that each lamp maintains its initial candle power throughout life. The table also gives the cost of energy which would be consumed by these lamps in furnishing 200,000 lumen hours. The 200,000 lumen hours are taken arbitrarily as a convenient basis for calculations.

Take any lamp in the table and divide the 200,000 lumen hours by the lumen value for that lamp, and it will give you a period in hours that the lamp must operate to give the 200,000 lumen hours. Dividing that period in hours by the hour's life of the lamp you get the number of lamps necessary to produce 200,000 lumen hours. The table is based on the assumption that each lamp maintains its initial candle power throughout its life. That is one fallacy in the table, but as authorities have not agreed on the average candle power of any one make of incandescent lamps throughout its life, they have not reached any definite conclusion as to what the average candle power of the old carbon lamp with which we have been familiar for years would be throughout life, and the newer metallized filament lamp is more vague, and as to the tungsten filament lamp they know very little about its maintenance of candle power throughout life, I therefore base my figures on the initial candle power, and the figures can be corrected by any person who can assume his own value for the candle power throughout life by simply deducting the proper percent.

CARBON FILAMENT LAMPS

Rated Total Watts	Operating Efficiency	Actual Watts Consumed	Actual Lumens per Lamp	Number of Lamps necessary to give 200,000 Lumen Hours	Cost of Lamp Renewals to give 200,000 Lumen Hours	Cost of Current to give 200,000 Lumen Hours
25	High	25.0	83.6	4.78	$.7170	$.598
	Medium	24.1	75.4	3.66	.5490	.6391
	Low	23.2	68.2	2.93	.4398	.6802
30	High	30.0	96.4	1.98	.2970	.622
	Medium	28.9	87.0	1.532	.2298	.6639
	Low	27.8	77.7	1.225	.1839	.7156
50	High	50.0	174.	1.641	.2462	.5745
	Medium	48.2	158.	1.266	.1899	.6101
	Low	46.4	142.	0.939	.1408	.6535
60	High	60.0	209.	1.367	.2050	.5742
	Medium	57.8	190.	1.053	.1579	.6096
	Low	55.7	170.	0.784	.1176	.6550
100	High	100.	349.	0.955	.2149	.5731
	Medium	96.4	316.	0.745	.1675	.6101
	Low	92.9	284.	0.521	.1173	.6540
120	High	120.	419.	0.796	.1791	.5735
	Medium	115.8	379.	0.620	.1396	.6101
	Low	111.4	340.	0.436	0.9810	.6550

METALLIZED FILAMENT LAMPS

Rated Total Watts	Operating Efficiency	Actual Watts Consumed	Actual Lumens per Lamp	Number of Lamps necessary to give 200,000 Lumen Hours	Cost of Lamp Renewals to give 200,000 Lumen Hours	Cost of Current to give 200,000 Lumen Hours
40	High	40.0	162.	2.058	.3455	.4934
	Medium	38.7	148.	1.500	.2270	.5230
	Low	37.3	135.	1.140	.1916	.5525
50	High	50.0	207.	1.380	.2230	.4830
	Medium	48.4	189.	1.058	.1777	.5120
	Low	46.7	172.	0.775	.1302	.5430
60	High	60.0	249.	1.148	.1928	.4820
	Medium	58.0	227.	0.881	.1481	.5112
	Low	56.0	206.	0.647	.1089	.5439
80	High	80.0	337.	0.848	.2375	.4750
	Medium	77.4	308.	0.649	.1816	.5025
	Low	74.6	278.	0.479	.1343	.5368
100	High	100.	419.	0.734	.2058	.4771
	Medium	96.7	384.	0.548	.1535	.5025
	Low	93.2	346.	0.413	.1156	.5388
25	High	25.0	187.	1.069	.5002	.2672
	Medium	24.2	173.	0.889	.4160	.2798
	Low	23.4	160.	0.735	.5441	.2925
40	High	40.0	319.	0.627	.3161	.2508
	Medium	38.9	298.	0.516	.2602	.2610
	Low	37.8	277.	0.425	.2141	.2730
60	High	60.0	498.	0.402	.2892	.2410
	Medium	58.2	464.	0.332	.2388	.2519
	Low	56.5	433.	0.272	.1956	.2610

TUNGSTEN FILAMENT LAMPS—Continued

Rated Total Watts	Operating Efficiency	Actual Watts Consumed	Actual Lumens per Lamp	Number of Lamps necessary to give 200,000 Lumen Hours	Cost of Lamp Renewals to give 200,000 Lumen Hours	Cost of Current to give 200,000 Lumen Hours
100	High	100.0	830.	0.241	.2341	.2410
	Medium	97.0	773.	0.199	.1935	.2510
	Low	94.2	722.	0.163	.1584	.2610
150	High	150.0	1245.	0.161	.2314	.2410
	Medium	145.5	1160.	0.133	.1910	.2510
	Low	141.2	1083.	0.189	.1565	.2610
250	High	250.0	2168.	0.092	.1828	.2310
	Medium	242.0	2009.	0.077	.1515	.2410
	Low	235.0	1873.	0.063	.1243	.2510
400	High	400.0	3470.	0.058	.2075	.2308
	Medium	387.0	3215.	0.048	.1725	.2410
	Low	376.0	3000.	0.039	.1413	.2509
500	High	500.0	4335.	0.046	.1828	.2308
	Medium	484.0	4020.	0.038	.1515	.2410
	Low	470.0	3745.	0.031	.1244	.2510

You will note several striking differences between this table and the former table. The principal difference is that the cost of renewals to produce a given amount of illumination decreases less rapidly than it did in the other table, but the cost of current to give a given illumination at low efficiency is materially over the cost of current to give that same illumination at high efficiency.

If we were to compare the 60-watt carbon lamp with the 60-watt metallized filament lamp and the 60-watt Tungsten filament lamp, we would find the following very interesting results.

	Rated Total Watts	Operating Efficiency	Net Price	Actual Watts Consumed	Actual Lumens per Lamp	Average Life	Cost of Lamps per 1000 Hous	Cost of Energy Consumed per 1000 Hours	Number of Lamps necessary to give 200,000 Lumen Hours	Cost of Lamp Renewals to give 200,000 Lumen Hours	Cost of Energy to give 200,000 Lumen Hours
Carbon	60	High	$ .15	60.	209	700	$ .214	$ .60	1.367	$ .2050	$ .5732
		Medium		57.8	190	1000	.15	.578	1.053	.1579	.6096
		Low		55.7	170	1500	.10	.557	0.784	.1176	.6550
Metallized	60	High	.168	60.	249	700	.24	.600	1.148	.1928	.4820
		Medium		58.0	227	1000	.168	.580	0.881	.1481	.5112
		Low		56.0	206	1500	.112	.560	0.647	.1087	.5439
Tungsten	60	High	.72	60.0	498	1000	.72	.600	0.402	.2892	.2410
		Medium		58.2	464	1300	.554	.582	0.332	.2388	.2519
		Low		56.5	433	1700	.424	.565	0.272	.1956	.2610

This table is simply a summary of the two preceding tables for these two sizes of lamps.

From the above it will be seen that when costs are based entirely on the number of hours, the higher the efficiency of lamps, the higher the cost for both lamp renewals and energy consumed, whereas when costs are based on the amount of light produced, the cost of lamp renewals for Metallized Filament lamps is a minimum, being 5% below the cost of Carbon lamps and 33% below the cost of Tungsten lamps, whereas the cost for current is materially in favor of the highest efficiency lamp. The cost of current for the Tungsten Filament lamp being but 50% of the cost for current of the Metallized Filament lamp and but 42% of the cost for current of the Carbon lamp. It would, therefore, appear that the central station to produce any given illumination should furnish Metallized Filament lamps if only the cost of renewals were to be taken into consideration and the ultimate consumer should take nothing but Tungsten Filament lamps if only the cost of current were to be taken into consideration. But by equating the earning capacity, the cost of renewals and the cost of current at any rate per kilowatt, and when lamps are burned at either high, medium or low operating efficiency, it can be readily found which lamp will give the user the most for his money, and which lamp will net the central station the most for its investment.

It has long been the idea that the lamp which gives the longest life is the best lamp to use, but if we were to consider the cost of renewals per kilowatt consumed, we would soon find a very interesting relation existing between the efficiencies of any type of lamp which would show that the value of the current consumed by the lamp is so far in excess of the value of the lamp itself that central stations would net an enormous profit by operating their lamps at high operating efficiency or above, even though the lives of the lamps would be comparatively short. To illustrate, if we were to take a 60-watt Metallized Filament lamp and operate it at medium efficiency on a 10c per kilowatt basis, the lamps would cost 16.8c per thousand hours, whereas the current consumed would be valued at $5.80. If we were to operate this same lamp at high operating efficiency, lamp renewals per thousand hours would cost 24c, an increase of 7.2c or 43% and the lamp would consume per thousand hours $6.00 worth of energy or an increase of 20c or 3.4%. This shows that the operation of the lamps at high efficiency instead of medium efficiency would increase the income from lighting 3.4% and would increase the cost of lamp renewals 43%, and would net the operating company on their investment to obtain this increase 178% less the nominal cost of 2 k.w. hours additional supply of current.

There are two thoughts which I wish to leave with you today, first—That no matter which process is used in making the filaments the strength of Tungsten lamps as received by the consumer is approximately the same and the lamps are all sufficiently rugged to withstand the abuse incident to use, and second—That the value as a business venture of increasing your cost of lamp renewals by operating lamps at higher efficiencies, thus increasing your net profits on a lighting load to a greater extent than you can by any other means.

That investment to obtain this increase is the 7.2 cents for the difference in cost of lamps per thousand hours at high or medium operating efficiency, less the nominal cost of furnishing two kilowatt hours additional supply of current.

The President. Before opening Mr. Fisher's paper to discussion I want to take just a moment to bring up a matter which requires action by class A members, and some of you may be obliged to leave before the discussion is finished. At our meeting in March it was voted to revise our constitution and by-laws to make them conform with the constitution of the National Association. Since that, however, the National Association has gone us one better, and has revised its constitution in some minor details. A committee was appointed to consider the revision of our constitution—the re-revision—and they have asked me to report that they recommend as follows:

That in Article IX, Section 6 the following be added: "of the National Association."

Add Section 8 to Article IX, as follows: "A registration fee of one dollar will be charged all men guests at conventions of the New England Section."

Add Section 9 to Article IX, as follows: "All dues shall be payable in advance and shall cover the calendar year. Any member in arrears for sixty days shall be suspended from all privileges of membership, but may be re-instated when he has paid all outstanding dues. In the event an applicant for Class B or Class E membership shall be elected after July 1, the dues for the remainder of the year shall be three dollars, which will entitle the member to a copy of the Proceeding and to the Bulletin for the remainder of the year."

Also it is amended so that the $5 for class B membership shall cover membership in the geographic section, but that there must be $2.50 additional paid for membership in any special section other than a company section.

I await any action you wish to take upon their report.

Mr. Whitaker (Portsmouth.) Mr. President, I would like to ask a question. You mentioned that there should be $2.50 additional for a class B member in any special section.

The President. In any special section other than a company section, for instance, the Commercial Section.

Mr. Whitaker (Portsmouth.) What about our New Hampshire section, where we do not call on the national treasury for any funds, we furnish our own? Do we have to pay $2.50 more?

The President. That is not a special section, Mr. Whitaker; that is a state section.

Mr. Whitaker (Portsmouth.) That is a state section, yes.

The President. But it is not a special section. A special section is such as the Commercial Section.

Mr. Whitaker (Portsmouth.) I bey your pardon, I did not understand it.

Mr. Lisle (Providence.) I move, Mr. President, that the report of the committee be accepted, and that the constitution of the New England Section be revised as submitted.

The President. It has been moved and seconded that the report of the committee be accepted and the constitution be revised as recommended.

(The motion was adopted.)

The President. We now come to the discussion of Mr. Fisher's paper. Mr. Fisher has certainly given us a very interesting paper on a subject which I know is not only interesting but rather aggravating to some of us, and I hope we can have a full discussion. We have ample time for it.

Dr. Bell (Boston.) I have been very much interested in the paper by Mr. Fisher, particularly in his data regarding the use of the tungsten lamps at various efficiencies. It is a thing of which most central station operators have thought too little. But there are one or two questions I would like to ask as a matter of information regarding the wire type tungsten lamp.

The first is as to the statement on page 6 regarding the importance of the development which led to procuring long lengths of tungsten filament. I would like to know what the nature of that development was. As I understand it, the filament in the so-called wire type lamp is just a straight, honest, well made, sintered filament, which has no more claim to be called wire than any other sintered filament has, contradistinguished from the drawn tungsten wire. As regards the relative merits of the two, the matter will be threshed out, I suppose, in due time. I have no special interest in that, but I would like to know whether there is anything whatever except the name to distinguish this lamp and the filament of this lamp from the lamps with sintered filaments heretofore made,—anything structural I mean. Of course I understand the filaments are made in greater lengths and supported differently, but this has nothing to do with the nature of filament. From the fact that it is supported differently and it is found advisable to make it in longer lengths it struck me that there might be something very interesting in the character of the manufacture which we should hear.

Another thing I would like very much to know is whether Mr. Fisher has tried himself or has any definite reports of experiments on the strength of tungsten filaments of various kinds in the sense in which strength is important in incandescent lamps, that is, strength against transverse breakage. The tensile strength is interesting, but it is only of academic interest. We don't care a rap what the pulling resistance of a tungsten filament is, for it is the lateral strain that does the mischief; and while all of the figures which are given for the tungsten filament in Mr. Fisher's paper are admirable in the matter of tensile strength, they are all practically equivalent to good copper wire, and if our tungsten filaments had the other mechanical properties of copper wire I think the whole Association would be most happy. It is the transverse strength which is important in the lamp, and I was hoping that Mr. Fisher might have some figures on that. I may say that I have tried these lamps for several clients, and they seem to give very good service indeed. As Mr. Fisher himself says, the tungsten lamps don't vary very much in their general properties, but as regards these technical matters I would like information.

The only criticism I can offer on the paper is that the wire type lamp is rather a misnomer, as I understand it, and I speak with a little feeling on the subject, because I often had the question put to me in the earlier days of its coming out, whether this was a wire lamp. I very soon ascertained that it was not a wire lamp in the sense in which it was generally understood. If Mr. Fisher will remember, the label inspired by the pure food law is no criterion of the quality of the goods, so I hope he won't take that as a serious criticism. But these technical points are of interest, because the transverse strength is vital, the tensile strength is a mere incident, and if there has been any radical departure in the way of getting a sintered filament of different qualities and higher uniformity, I feel sure the Association would be very glad to hear about it.

THE PRESIDENT. Mr. Fisher, will you answer that question of Doctor Bell's?

MR. FISHER. In response to Dr. Bell's inquiries, the development of process referred to is the ability to obtain a sintered filament in long lengths.

DR. BELL. How long, may I ask?

MR. FISHER. We have squirted 0012 filament in lengths of 3,400 feet without a break. We have squirted the largest sizes to the extreme capacity of the container holding the paste. The only question is to get a container long enough and large enough to make filaments miles in length, providing there is no blasting going on outside. In that connection I might say that the D. L. & W. are making some radical improvements in the way of depressing their tracks just adjacent to our works, and when we asked the foreman to kindly stop putting off heavy blasts he wanted to know what for. We told him it was breaking all of our filaments, and brought him in and showed the machines in operation. He said there was nothing there but a bunch of light, and that he could not feel the filament even though he had his hands full of it. But the shock of the blasting, when exceptional heavy blasts were fired, would break the filaments in all machines.

The development in the way of improvement in the filament itself, Dr. Bell, has been in the minutiae of process. The filament is more dense than the filaments of a few years ago, at least our physical department reports so to me, and it looks to be materially closer knitted, if you can put it that way, on the surface, but there has been no radical change other than in the minutiæ of manufacture.

In regard to strengths, and judging from the tensile strength, Mr. Scott's paper read before the St. Louis convention of the National Electric Light Association covered a rather complete comparison of the wire type lamp of that day and the fused type lamp. Unfortunately, recently we have made no tests on that same direct line ourselves. I have only the report of an engineer who tested lamps by placing them on an inclined plane and rolling them off over the side of the incline, increasing the height of the drop an eighth of an inch after being dropped five times, the lamps were connected to a light wend so they would always fall on their sides. In his report of the strength of lamps he showed that when lamps were new the drawn wire lamp would stand a slightly greater drop than the wire type lamp, as an average, but when lamps had passed the 200 hour mark the wire type lamp and the drawn wire lamp were equal, and when lamps had passed the 400 hour mark, in burning that is, the wire type lamp was materially superior to the drawn wire lamp. But his tests indicated that the drawn wire lamp was sufficiently strong to meet all the conditions of the service in which it was required. He was a consumer of drawn wire lamps investigating our lamps and reporting that they were stronger than the drawn wire lamp, but that the drawn wire lamp was sufficiently strong to withstand all of the conditions of service.

On that laboratory test, Dr. Bell, there was a transverse test. The lamps were suspended vertically, tipped downwards, and the table was jolted back and forth so that you got a whippy motion. On that test there were several very interesting things developed. In the first place, lamps were operated in three different ways, at full brilliancy, with 4 volts across the terminals of a 60-volt lamp, and 60-volt lamps cold or without current on them. Of the lamps which were operated at full brilliancy, on the first 200,000 shocks, if my memory serves me rightly, there were seven lamps out of twelve broken; of the lamps that were burning at 4 volts there were five lamps out of twelve broken at 200,000 shocks. Of lamps which were not burning at all there were none broken. I might state also that tests on drawn wire showed exactly the same condition, that the drawn wire lamps which were operated under current broke very heavily, those that were burning at the highest voltage broke to the maximum percentage. At the end of 400,000 shocks those lamps which were burning at full brilliancy were all gone. There was but one lamp out of twelve left of those that were burning at 4 volts, and on an analysis of this effect it was decided that the plastic filament whipping and pulling itself in two. It was not a break, it was simply a clear case of pull in two, because tungsten is very plastic when heated to that temperature, and although the movement is small and the mass is slight the constant whipping and jarring will eventually pull the filaments in two. It is like the proverbial drop of water on a stone, it hammers them out.

We are conducting at the present time a series of tests which will be slightly more interesting. We are following out Mr. Scott's idea. We have procured a lot of lamps of different makes, and will start with the lamp before burning. We take five of the lamps, first rolling them off the incline until we get to the point where the five lamps will break, then suspending the lamps both horizontally and vertically from a very light board and dropping a weight on that board, increasing the height through which the weight falls, 4 inches, on each five shocks until we increase it to 60 inches, and find at what point the lamps break, and after we reach 60 inches continue to drop the weight until the lamp breaks recording the number of drops necessary. After the lamps are broken in this way we will make an internal examination to find the comparative tensile strengths and anything else we can discover on the strength of the lamps when new and after burning other lamps for 50, 100, 200, 300 and 400 hours, testing them in the same way thus making a rather complete and exhaustive investigation of the strength of tungsten lamps.

THE PRESIDENT· The proof of the pudding is in the eating, and while we are always very much interested in the manufacturer's viewpoint on the lamps the thing that interests us ultimately is the cost to us from an operating standpoint. Some of you here have, I know, had some practical experience with this type of lamp. I believe, Mr. Hayes, that you have. Won't you give us some of your experience?

MR. HAYES (Fitchburg.) Mr. President, I cannot say with any great authority as to what the wire type lamp has already done. My first opinion of the ductile filament lamp, which was formed without complete information on the subject, led me to believe it would be far superior to the wire type lamp, and in considering as to which was preferable I was more favorably inclined to the ductile filament lamp. However, we have had occasion to use the wire type lamp, and after a number of months' use of them I must say that the reports are favorable, that they are not easily broken, that they are giving very good service, and it would seem that they are altogether a serviceable commodity.

THE PRESIDENT. Mr. Smith, I think you have some experience with this type of lamp where the packages have been broken in transit. It would be interesting if you could tell us of that.

Mr. Smith (Salem.) Mr. President, I don't think I have any data I could give that would be of particular interest. It is true that when the lamps were first shipped to us we were getting rather excessive breakage, but in the meantime there seems to be an improvement, and the performance of the lamp has improved so much of late, that we have not had any material or special complaint made by our customers in the use of the wire type lamp. We are certainly very pleased with the service we are getting from them today.

The President. I would like to ask Mr. Fisher if in that test the lamps which were operated cold had ever been burned at all.

Mr. Fisher. I am not positive as to the period of time, but the way they test the lamps as to whether they fail or not is once in every so many shocks, I think it is something like 250 shocks, they just flash the current on and off again. So that the lamps had not been burned—that is, if you refer to that shock test?

The President. Yes, sir.

Mr. Fisher. The lamps had not been burned in service, but you may not know that all lamps are burned in manufacture. The exhaust process makes it necessary to heat the filament slightly above its normal burning temperature in order to drive out of the filament all of the gases contained therein, and the period of time that the lamp burns above its normal operating temperature is dependent upon the differences in manufacture methods, and while in no plant is it long it is enough to crystallize or affect the filament as much as any short period of early burning would affect the filament. In regard to burning in the exhaust process in our own works, and I think in most others, the lamps are given a period of seasoning, because the lamp just after exhaust changes in candle power very rapidly with constant voltage, and we burn lamps on seasoning racks until they pass the rapid change in candle power before rating the lamp for voltage, so that we may be sure as to its candle power when shipped. All lamps are burned these two periods in the process of manufacture, but these lamps were not burned in commercial service.

Mr. Hayes (Fitchburg.) There is one point which Mr. Fisher has not touched, either wittingly or otherwise, and that is the blackening of lamps. I would like to inquire if he could give the percentage, if it can be expressed, of blackened lamps now when the lamps are manufactured and that of a year ago. We know we do get some blackened lamps at the present time.

Mr. Fisher. Oh, blackening, like the poor, is always with us. Not quite a year ago we had a very high percentage of blackening, it was absolutely abnormal, which was due to a combination of circumstances of glass, platinum and exhaust. While we laid it up against platinum I think it was more glass than it was platinum, but it was purely a case of gases in the lamps that gave us quite a heavy percentage of blackening. In our investigation of our losses in service last year, that is, on the customers' lines, from all causes, blackening, breakage or any other cause, amounted to 1.8 per cent. of the total. Part of that was due to this blackening. Just what the percentage is I am not sure, but the blackening during a period of nearly six weeks was in comparison with normal conditions. These figures were obtained through reports from our Claims Department, where we would naturally hear of blackening as soon as it exists, and they have not heard of blackening as a real trouble in seven months. They get an isolated case of a lamp blackened here or a lamp blackened there now and then, but in the last seven months we have had virtually no trouble whatever from blackening, especially on the smaller sizes.

The President· Is there any further discussion on this paper? If not, gentlemen, that finishes the program for the morning. Before we close I want to thank every member for his attendance at the convention and also to thank those who have contributed to the discussions. I want to ask you to bear in mind that while this Association has but one or two conventions a year the work of the Association is going on every day in the year, Sundays excluded, and that our Secretary's office is always open and is always busy; that we owe it to ourselves, we owe it to our patrons, to do all that we can to advance the central station industry of New England, and that we owe it to each other to give each other the benefit of any new or interesting or unique experiences that we may have, and that our office is at all times a clearing house for such information.

The convention is closed.

THE ANNUAL BANQUET.

The annual banquet was served on Wednesday evening, September 28.

In opening the subsequent proceedings the President said:

President Sands.

There is a story told of two travelling men who were on a train together, and one complained bitterly to the other of the speed of the train. The other man replied, "Yes, this train is slow, but they do run some fast trains over this road. I rode on a train the other day that went so fast that the telegraph poles along the line looked like the teeth of a fine tooth comb." The other man thought a moment and he said, "That is nothing. I rode on a train the other day that went so fast that the patches of corn and beans along the way looked like succotash." (Laughter.) That certainly was going some. Whether that was on a New Hampshire railroad or not I do not know. New Hampshire railroads have, however, gone some in the past, both figuratively and literally.

It is almost impossible to think of New Hampshire railroads without at the same time thinking of New Hampshire politics. There seems to have been a very close relation between the two in the years gone by, and New Hampshire politics, like New Hampshire railroads, have gone some. Both, however, have made for progress, and particularly during the more recent years. The campaign in this state of a year ago had for its watchword Progress. The platform adopted by the victorious party was a decidedly progressive platform, and one of the planks in that platform was the regulation by the state of all public utilities operating within the state. That this was no mere idle campaign war cry is evidenced by the fact that New Hampshire has today a public service law and a public utilities commission. We are indeed honored and fortunate in having with us tonight the man who led his party through that progressive fight to victory and who is now the chief executive of this state, and it is my great pleasure to present to you the Hon. Robert P. Bass, Governor of New Hampshire. (Great applause, everyone rising as Governor Bass rose to address the assembly.)

HON. ROBERT P. BASS, GOVERNOR OF NEW HAMPSHIRE.

Mr. President, Ladies and Gentlemen: I am only too glad to be here tonight with you, and especially so to have this opportunity to say a few words about a subject which affects you all either directly or indirectly, and which is of much importance to all of our New England states, I refer to state regulation of public utilities. If my speech seems a bit dry to the ladies I must beg their indulgence.

During our last political campaign in this state the question of the regulation of the public utilities in New Hampshire was one of the main issues, for the people of New Hampshire had come to realize through some rather trying experiences that uncontrolled monopolies are a menace to the public. I was all through the campaign, and am now, of the opinion that the time has arrived when these unregulated monopolies should no longer be permitted, that we should have, not the semblance of regulation, but real bona fide regulation of our public utilities corporations. All through the campaign it seemed almost impossible to make the representatives of some of our corporations in this state realize that such regulation was for their benefit as well as for the benefit of the public generally. Yet I am firmly of the opinion that this is the case and that experience is demonstrating the truth of this fact.

State regulation has been applied more or less effectually to railroads for a good many years, but state laws governing gas, electric supply, telephone and telegraph service and other kinds of public utilities were entirely inadequate until the public service commission laws of the last few years. So far as my knowledge extends, Massachusetts led her sister states by first providing in her laws for a limited regulation through the gas and electric light commission in that state, This commission was without the power to compel action, but it has achieved large success in protecting the public by its recommendations without having the power to enforce its orders. The stability which this form of regulation has given to the companies, resulting in placing their securities in the highest class of investments has been an object lesson to managers of similar enterprises in other states and has led them to welcome similar laws. It seems to me, however, that the Massachusetts law falls short of real regulation, because this very power to compel a stubborn management to comply with reasonable orders is essential and necessary to maintain the supremacy of state regulation. The state of Wisconsin took the lead, and still holds it, in providing a comprehensive public service law and public utilities commission. New York, under the guidance—or perhaps to put it more accurately under the compulsion—of Governor Hughes, followed soon after with a fairly effective law, which did not at first include all the utilities, while Connecticut, Vermont and New Hampshire, the latter this year, are the New England states which have provided their people with this important statute.

Three essential requirements characterize all legislation on this subject: (1) adequate service, (2) reasonable rates, (3) no unjust discrimination. All the provisions of the most elaborate laws dealing with this subject will be found to apply to one or another of these three essentials.

Under adequate service will be found not only the requirements that the service rendered to a community shall be adapted to its needs, but that the service shall be furnished with due regard to the safety and convenience of employees as well as the public. The candle power of gas, automatic couplers on freight cars, underground wires, the elimination of grade crossings, are a few of the widely separated instances of matters which fall under this heading. In a measure, electric companies can be relied upon to furnish fairly good service just because it pays, for it has been found easy to provide capital for putting this business on a very high plane of efficiency.

The public is most interested as a concrete problem in securing low rates. The customer cannot be expected to measure the relation between the kind of service rendered and the rate charged, or to measure it accurately, but the public as a whole has a very vital interest in this point, whether it realizes it or not. It is obviously for the ultimate good to have a rate maintained which will pay for efficient service and provide a reasonable return on the capital invested. If the public demands more than this it will be due to the practical impossibility of its understanding what is a fair price for the service rendered. The companies themselves are sometimes unable fully to explain the reasons for the rates they establish, and so long as electricity is sold for two cents or less for power and fifteen cents for light some confusion is bound to arise in the minds of the public, and particularly in the minds of those who pay the higher rate. The matter of rates, involving as it does the return on the capital invested, leads inevitably to regulation of the issue of securities upon which interest and dividends are expected.

For many years most of our states have allowed securities to be issued without any limitation except the good sense of the projector of the enterprise. Under this method many companies have been capitalized, at least as to their common stock, on the basis of earning power, present and prospective, without regard to the physical value of the property. The principle of regulation, which permits a fair return on the money invested, forbids this easy road to fortune. If the public must pay dividends and interest it has a deep concern to see that the fund on which these are computed is actually put into the property, that is, put to work for the benefit of the property. So we find in all these laws provisions for requiring the consent of the commissions to all issues of stock and bonds, and in passing upon the sale of these securities the commissions must require that the corporations receive a fair price. It is hard to see how the earning power can be capitalized under such a statute, unless the lawyers find a way to set aside the intent of the law. It seems to me that this feature will be more objectionable to promoters than it will to men connected with prosperous corporations, which as a rule are averse to reducing the value of outstanding stocks by issuing new stocks at less than their real value.

Discrimination has been a source of great injustice in our history, particularly in railroad service. How far the varying rates for different classes of electric service are justified by different conditions of use is a matter which the companies and the commissions must deal with in the near future. On purely non-competitive business, that is, where the customer cannot supply himself, the commission must protect the consumer, lest the small user be required to pay for part of the current supplied to the large user. A very encouraging tendency of electric companies today is to work out of special rates to a regular schedule, and this may in time eliminate this whole problem of discriminatory rates.

Many states recognize the principle that a monopoly may be permitted in public service provided it is so fenced in by regulation that it cannot exercise any of the vices of a monopoly. The idea of an unrestrained monopoly is contrary to the public interest. In practice, however, some advantages are found in allowing one company under suitable restrictions to serve a given field, and in so far as these advantages render a monopoly beneficial rather than harmful a company ought to be protected from unnecessary competition where such competition will ultimately cripple the service. The tendency of companies in the same lines of business to consolidate shows the futility of expecting competition to furnish any adequate protection to the public, and thus we come right back to the necessity for regulation.

Whether a regulated competition would produce better results than a regulated monopoly may be, and is, a very interesting question, but it is not a vital issue today. In our state we have a carefully drawn law which is primarily designed to protect the public, and at the same time to recognize and safeguard the investor. We cannot hope that this law is perfect, but it has most, if not all, the essential features of a comprehensive system of regulation of all public utilities. We have also a public service commission, composed of able, fairminded men. I bespeak the co-operation of those of you who operate in this state in carrying out this law under the commission, and in helping us to better or improve this law in any respect where it may be found faulty.

I thank you, Mr. President. (Applause.)

THE PRESIDENT. When Miss Billings was Secretary of our National Electric Light Associatioin she had the title by those who knew her best of Mother of the Association. Our present Secretary is fast becoming known to us all as Father of the Association, and he deserves that title too. When we get in trouble we go to him as to a father confessor for assistance, and we know that we are going to get it if it is within his power to give it. Last July I told him about this convention, and he expressed grave doubts as to his ability to be here, owing to a previous engagement on the Pacific coast. I did not let that trouble me at all, because I knew that if there was any possible way for him to get here he would get here, and as a matter of fact he got here about ten minutes before we came in this room tonight. Whether he came by train or aeroplane I don't know, but he is here. He needs no introduction; you all know him, and I know you will all be glad to hear from Secretary Martin of the National Association. (Great applause.)

Mr. T. Comerford Martin. Mr. President, Ladies and Gentlemen: I am very glad indeed to be here this evening, even if my late arrival may have postponed the inauguration of these festivities, but when you consider that I left Chicago yesterday afternoon at half past two you will realize that it was something of a task to get here a little bit earlier, and when I mention that fact I think it may be cited to the credit of our transportation companies that such a feat as that is possible, whether the companies are regulated or not by interstate commissions. (Laughter and applause.) In these days, gentlemen, and I am glad to say it in the presence of his Excellency the Governor of this state, whom I hold in high regard and whose views I am glad to echo on the outlook, we who are connected with public service corporations are getting a great deal of advice and instruction as to how we should tread the narrow and not the primrose way. You may possibly remember the story of the old lady who handed out ten cents to a tramp and accompanied it with a little advice, and then said she gave it to him not because of the advice, but just to please her sense of philanthropy. He said to her, "Well, Madam, why don't you make it twenty-five cents and enjoy yourself thoroughly?

Very much in the same vein that other anecdote, which you may possibly remember, of Johnnie, who sat at breakfast one morning eating buttered toast and diligently laboring to extract the soft core from the crust, which he piled up as a rampart around the edge of his plate. His father, who was reading the morning paper, as fathers are apt to do, looked over his glasses and said, "Johnnie, aren't you eating the crusts?" Johnnie said, "Why, no, father." "Well, when I was a small boy like you I ate them." "Did you like them, dad?" "Why certainly I did." "Well, you may have these." (Laughter.)

I have, as our worthy President has just stated, arrived here en route for home from the Pacific Coast, and while I was out there I was very much interested in the trend of this commission development,—a splendid thing,—and I think I echo the sentiments of every public service corporation man before me when I say that we have no objection to regulation.

Either the state regulates us or pretty soon we will regulate the state, but there are metes and bounds. I was very much interested while on the Pacific Coast to notice how there was a further expression—development—of this idea, so that in Oregon there had been an endeavor and an effort to create local public service commissions, so that a public service corporation in every city and town of the state was to be subject to the orders and the control of a local commission. To me, gentlemen, that seems to be regulation gone crazy, and the people of the state have not stood for it but have voted it down. We have an instance of what that may amount to in St. Louis, where after a physical valuation made about a year ago by experts, in whom we have the utmost confidence as to their integrity and ability, the local public service commission scaled down that valuation some $4,000,000, and the scaling down was done by the engineer of the local public service commission, who himself as a public service commissioner validated and approved his own decision. God save us all from such regulation as that.

I am very glad indeed to be here tonight to speak for the National Electric Light Association, whose Secretary I have the honor of being. I am very glad indeed to find that we have the honor and distinction of having with us and as the first speaker of the evening the Governor of the state. And you will permit me to mention in this connection the fact that the National Electric Light Association during the present year has had the honor and the privilege of having as speakers at two of its meetings two members of the national Cabinet, the Secretary of the Interior, Mr. Fisher, and the Secretary of the Department of Commerce and Labor, Mr. Nagel I think that that may be taken as a very good indication, and as a very good indication and proof, of the progressive spirit which inspires the work that the National Electric Light Association is trying to do, because we may regard those two men, members of the Taft Cabinet, as essentially highminded, progressive statesmen of the distinctive American type. Mr. Fisher came to New York to take part in our meeting and conference with regard to conservation, and Secretary Nagel came three months later, to approve and validate the report of our public policy committee with regard to measures which should ameliorate and advance the condition of the employees in the industry, 100,000 of them. That is but a little indication of the work which the national body is doing, and I am very glad indeed to find, as I might expect to find, that your own work is along the same lines.

I am very glad indeed to report, as the result of my trip to the Pacific Coast, using, as I had the opportunity to do, the example of the New England Association, that last week I assisted in the affiliation of the great Northwest Electric Light and Power Association, embracing five states: Washington, Oregon, Idaho, Montana and Wyoming. I am very glad indeed, gentlemen, to be the bearer of a mission from that great aggregation of states and transmission companies, which salute and congratulate you, Mr. President, who once lived out there, and in doing that I bring with me a message from one of your former presidents, the gentleman who succeeded Mr. Smith and preceded Mr. Campbell, Mr. J. E. Davidson of Portland. (Applause.) I think it is significant of the training that a man gets in the New England states in carrying on the central station industry that at the meeting last week, when that body affiliated, Mr. Davidson, your own former President, was elected President of that body, after one year of residence on the Pacific Coast. What might have happened to Mr. Sands had he stayed there the Lord only knows! Mr. Davidson charged me, if I were able to get here, with a message of congratulation on the splendid growth and success of your own Association, and I was very glad indeed, as I have said, to use the example of the growth and the development and the prosperity of the New England Section as one of the means of bringing the Northwest Association into affiliation and closer membership with us.

The idea underlying the creation of geographic sections of the N. E. L. A. is one of federation. I think I might, if you would allow me to, compare it to central station practice, and say that the parent body, the N. E. L. A., is simply the bus bar, and that the various state and geographic bodies are the generating plants, throwing their energy into those bus bars so that it may be distributed throughout the country to all the other plants for the development of information and knowledge in regard to electric light and power and other forms of energy.

I was very glad indeed while I was out west also to take part in the creation of a company section in Portland, Ore., with 100 members the opening night, and on my way home last Monday to assist in the organization of a company section in St. Paul; and to take steps for the creation of company sections in Seattle and Spokane and Minneapolis. To-day the National Electric Light Association, representing interests both engineering and industrial, stands as the largest body of the kind in the world, so that you, gentlemen, and I, are citizens of no mean body as members of that Association.

I have one other message to deliver to you, and that is one of cordial and fraternal invitation from sister and member companies on the Pacific Coast to participate in our convention which will be held in Seattle next year, the second week in June.

The central station industry is the same throughout the country, but it is dealt with under differing aspects and under changing conditions all the time. How rapidly changing our conditions are we hardly realize. A student in Columbia University, last year answering one of the questions put to him, as to what were the political and strategic reasons which compelled Washington to cross the Delaware, gave as his answer this: "The Pennsylvania tunnel under the Hudson had not been built." (Laughter.) Such an answer is not so foolish as it seems on second consideration, for it simply carries with it the implication that our engineering methods, and particularly our electrical methods, are changing the aspect of the entire civilization of our country, making vast and important and vital changes in our social and industrial relationships. And another feature in connection with our work is that while we were centered upon our own engineering problems a few years ago, as Governor Bass has indicated in his pertinent and pregnant speech, our outlook today is that which brings us to deal with problems concerning the government and the public; and we might add to that, problems also which concern our employees. In all these questions and in all these respects and aspects the National Electric Light Association is trying to do progressive and educative work, and it is very glad indeed to feel that it can point to such a brilliant example of coordination, co-operation and affiliation as its New England Section. (Applause.)

The President· I am sure that we all are deeply grateful to both Governor Bass and Mr. Martin for these inspiring addresses. Both have come here at no little personal inconvenience. Governor Bass has made a plea for the co-operation of the central stations in New Hampshire in the matter of public regulation and control. I feel sure that he can be assured of the co-operation not only of the central stations in New Hampshire but also of every central station in New England, and I propose that before we adjourn we arise and give three cheers for the Governor of New Hampshire and bid him Godspeed in his progressive movement. Are you ready?

(The cheers were vigorously given, and the meeting then adjourned.)

PROCEEDINGS

of the

Third Annual Convention

NEW ENGLAND SECTION

of the

National Electric Light Association

HOTEL KIMBALL, SPRINGFIELD, MASS.
MARCH 21 and 22, 1912.

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Arthur B. Lisle, Vice-President, Providence, R. I.
W. E. Holmes, Treasurer, Cambridge, Mass.
Miss O. A. Bursiel, Secretary, Boston, Mass.

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L. J. Chase, Concord, N. H.
Geo. S. Haley, Rutland, Vt.
L. D. Gibbs, Boston, Mass.
A. F. Townsend, Woonsocket, R. I.
F. D. Adams, New Haven, Conn.
Howard T. Sands, (Ex-officio) Boston, Mass.

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F. D. Gordon, Lewiston & Auburn Elec. Lt. Co., Lewiston, Chairman.
W. S. Wyman, Central Maine Power Co., Waterville.
Howard E. Corning, Bangor Ry. & Elec. Co., Bangor.
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J. P. Proctor, Franklin Lt. & Pr. Co., Franklin Falls.
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Fred H. Smith, Worcester Elec. Co., Worcester.
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F. D. Adams, The United Ill. Co., New Haven, Chairman.
C. A. Paul, The United Ill. Co., Bridgeport.
Chas. A. Learned, Meriden Elec. Lt. Co., Meriden.
Wm. M. Lewis, Rockville Gas & Elec. Co., Rockville.
F. W. Prince, The Hartford Elec. Lt. Co., Hartford.
R. A. Manwaring, The United Ill. Co., New Haven.
S. A. Smith, United Elec. Lt. & Water Co., Waterbury.

Proceedings of Third Annual Convention of the New England Section of the National Electric Light Association held at the Hotel Kimball, Springfield, Mass.

MARCH 21 AND 22, 1912.

Under the presidency of

MR. HOWARD T. SANDS, Boston, Mass.

Opening session, 1.30 P. M., March 21.

PRESIDENT SANDS. I am glad to welcome you all here today. I am pleased to see quite a number here wearing the guest badge. To those I would say that we bid you welcome. We want you to feel that you are one of us and are at home with us. I will ask Mr. Holmes if he will take the chair while I read my address.

Members and Guests:

The New England Section has gathered here to celebrate its Third Birthday, and it bids you one and all welcome to the feast.

Although but three years have elapsed since the Section was organized, it has today a record of which it may well be, and is, justly proud. I think it is a fair statement that none of those who gathered at the meeting in Boston in December, 1908, when the Section was first organized would have dared to predict that in three years we should be able to approach in even a small measure our present membership. Membership, numerically speaking, does not, however, indicate the real strength of the Section. Back of this and underlying all is a permanency which has evidenced itself in many ways during the few short years of the life of the Section.

We cannot, however, rest upon our laurels nor can we afford to let the contemplation of our past record blind us to the responsibilities of the present and of the future. That there is a large opportunity and need for increasing our membership is very evident and we should bear in mind that the measure of the realization of that opportunity will be the value and the scope of the service which the Section renders to its members.

The programme of this convention has been selected with a view of dealing with topics that are of vital interest to the New England Central Station today. The character of the papers to be presented and the discussions which they are sure to evoke is of far greater importance than anything that I can possibly say; therefore, I shall confine my remarks to a brief review of the work of the past year with possibly some slight reference to the future.

At the convention at Bretton Woods in September, I spoke of our new headquarters at 149 Tremont Street and expressed the hope that every member would treat it as the home of the Section, making it a point to visit it whenever in Boston. Very shortly afterwards, we found that we had already outgrown the quarters selected, making it necessary for us to secure larger quarters in the same building, and our Secretary reports that the number of members who avail themselves of the privileges of the office is constantly increasing. I wish again to urge upon you that you do not fail to visit us whenever you can conveniently do so and in any event, that you call upon the office for any help in connection with the advancement of the electrical industry in New England—and I can assure you that in the office you will find a ready response.

Our financial condition has been thoroughly presented in the excellent report of the Treasurer and I can but add that we have weathered the financial storms which looked so threatening in the first two years of our existence and are now able to conduct the affairs of the Section on a "pay as you go" basis. This means that the Section has demonstrated its ability to pay the expenses of a permanent office, a permanent Secretary and all expenses in connection with our conventions and still keep within the limit defined by the Constitution of the National body,—namely, 50% of the annual dues paid by members of the Section.

The question of the number of annual conventions is a subject to which the Executive Committee has given considerable thought. Shortly after the September convention, a letter was sent to all Class A. and Class D. members, asking for their opinions on this subject. The nature of the replies indicated a very wide divergence of opinion and from these various opinions there was but one point on which the majority expressed themselves—namely, that if but one convention were to be held each year, that convention should be held in the Fall. With this in mind, an amendment of the Constitution, changing the date of the annual meeting from prior to April 1st to prior to November 1st in each year, will be offered for your consideration before the convention closes.

It has not seemed best to the present Executive Committee to take any definite action as to the number of conventions to be held each year, but to leave that for some future administration to definitely settle as may seem to it best at the time. While no official action has been taken, I think I may state without any embarrassment to the incoming administration that it is the unanimous opinion of the present Executive Committee that the Section should hold a convention in Boston some time during the progress of the Big Electric Show, which is to be held during the entire month of October, 1912. This Show bids fair both in magnitude and character to outclass anything ever attempted in this line either in this or any other country, and it will doubtless afford a medium for bringing to Boston at some time during the month every man connected with the electrical industry throughout our territory. It therefore seems eminently fitting that at some time during the month, the Section should act as host and welcome the New England electrical industry to its convention.

At the National Convention held in New York last June, there was offered an amendment to Section 6 of Article 3. This amendment consisted in adding the following words—

> "Or they may be other persons interested in advancing the central station industry, not employed by a company eligible for membership, proposed and recommended by the Class A. member in the territory where the applicant resides. They shall have the same privileges as Class D. members."

At our convention at Bretton Woods last September, our own Constitution was amended to coincide with that of the National body in this respect. The Membership Committee of our own Section and of other sections as well, have placed different interpretations upon this clause, but at a meeting of the Executive Committee of the National body held in January of this year, the following interpretation was authorized —namely, that any contractor or contracting firm doing a local business as distinct from a national business might individually become a Class E. member of the Association upon the approval in writing of a Class A. member in the same territory, and that their employees may become Class E. members whether their employers are members or not.

This interpretation not only opens up a tremendous field for increasing our membership but also affords the central station an opportunity for establishing more cordial relations with the wiring contractor.

In the early days, the contractor was looked upon as an arch enemy of the association and his particular field seemed to be the pushing of the installation of isolated plants. With the growth of the industry, there has also come a broader outlook and today the contractor is being recognized not as an enemy but as an ally of the central station. We are all brothers, of the family electrical, and therefore it behooves us to live and work in harmonious relationship. This question will be treated in detail in one of the convention papers.

One of the principal achievements of the past year has been the launching of the Luncheon Club Branch of the New England Section. Nearly all of you here are familiar with its details and know in a general way of the tremendous success which it has thus far achieved. This success is, in a large measure due to the untiring efforts of the Chairman of the Luncheon Club Committee—Mr. Gibbs—who has thrown himself with characteristic energy into the work of the Luncheon Club Branch.

Started in January, the Club has met on nine consecutive Fridays, with an average attendance of approximately 300 and tomorrow will hold its regular weekly meeting in this room. To be able to bring together 300 men engaged in the electrical industry during the noon hour of a busy business day seemed an impossible task; but to bring this number together week in and week out is something which I believe has not been approached by any other electrical Luncheon Club in the country. New England, as usual, has set the pace. This movement is one which is bound to benefit the section, to attract new members and to increase its opportunity for helpful work.

The importance of a universal system of accounting which should be so elastic as to adapt itself to the plant operating in the small town as well as the large company operating in our metropolitan cities was long ago recognized by the leaders of the National Association and after a great deal of careful work, thought and study, the N. E. L. A. System of Accounting was presented to our Association and officially adopted. With the establishment of public service commissions in the various states, this matter of a standard system of accounting becomes a very pertinent one. The New Hampshire State Section, at a recent meeting, appointed a committee to confer with the Public Service Commission in that State with a view to presenting the advantages of the Standard N. E. L. A. System of Accounting. This Committee has already had one conference and in the near future will render a report containing recommendations for a system of accounting which will be substantially in conformity with the system adopted as standard by the National Association.

During the year, the Section has been represented by its President at every meeting of the Executive Committee of the

National Association save the meeting which was held in New York this morning, which for obvious reasons it was not possible to attend. I wish to acknowledge the uniform courtesy which has been extended to the representative of the Section by every member of the Committee and the consideration which has always been shown for the interests of the Section and of the work which it is doing.

We are an integral part of the National Body and the relation between the parent body and the Section is one which should never be lost sight of. We constitute no small portion of the greatest electrical organization in the world and one which is not going to rest until every central station and every industry connected with the central station is brought into its membership.

The decision of the National Association to accept the cordial invitation to hold its next Convention on the Pacific Coast affords to the New England Contingent an opportunity which but seldom comes. You will all doubtless receive within a few day a circular issued by the transportation committee, showing the various routes offered and I hope and believe that the New England Section will have no need to feel ashamed of the size of its representation at the Seattle Convention in June. At the Luncheon Club meeting tomorrow noon, it will be our pleasure to learn something of the wonderful country which will be traversed in going to and returning from the convention.

In closing, I wish to thank the various officials of the Section for their splendid work and support of the past year. Your Secretary has been untiring in her efforts to develop the Section and to answer every call for assistance which has been received from the members. The Treasurer has, at a great deal of personal inconvenience, attended to the details of his office, and each and every member of the Executive Committee has gladly given of his time, experience and judgment to the work of the Section.

The Central Station is gradually but surely coming to its own. The Pioneers who laid the foundations of the industry builded better even than they knew. The record of the industry has been one of progress and achievement in spite of many obstacles. Through its energy and persistency, electric service is now possible even for the smallest towns and hamlets. And yet the industry is but in its infancy. The future looms before us bright with promise. It is the purpose of the National Electric Light Association to gather into a co-operative organization the tremendous energy of both brains and capital now engaged in the industry and to use this potential force for the advancement of the art throughout this country.

To this work, the New England Section will bring in the future as it has in the past, the same calm, steady but persistent effort which is characteristic of New England enterprise and which spells New England Success.

On motion, the President's address was referred to the executive committee.

President Sands. Next on our program is the report of the Secretary, which Mr. Holmes will read.

REPORT OF THE SECRETARY.

New England Section-National Electric Light Association.

Miss O. A. Bursiel.

Our Big New England Section has grown even bigger and more important as an influence in the National Electric Light Association and in the electrical field since our last convention. It keeps on doing big things.

At times there may be weeks and even a month or two when it would appear to the casual observer that we as a Section were making no progress—just marking time. But experience has borne out the fact that we seem in those periods of quietude to be gaining strength and gathering energy to undertake some new, larger and better endeavor.

One of the very important evidences of the substantiality and permanence of our organization has been the establishment of our permanent headquarters in a spacious office in the Lawrence Building, at the corner of Tremont and West Streets in Boston. When permanent headquarters were first decided upon a small room was taken in that building, but the holding of one or two Executive Committee meetings there with all the avoirdupois of the Executive Committee, present and accounted for, the room was found to be, to say the least, too modest in size. Not alone the comfort of the members of the Committee was considered in moving to a larger room, however; it was impossible to do the steadily increasing volume of work that is devolving upon your secretary, without space to accommodate the additional clerical force needed, make proper provision for the keeping of files, stationery, etc., and have space for the convenient and efficient use of the labor-saving appliances which are necessary.

Your secretary wishes to extend the most cordial welcome to all members of the Section when in Boston to visit the headquarters; the office is open from early morning until 5 P. M. and often later. The literature of the National Association such as the "Solicitor's Handbook," "Classification of Accounts," "Revision of the Question Box," etc., etc., may be purchased here.

Since the convention at Bretton Woods I have executed several membership campaigns, the largest and most influential being my appeal to our 600 Class B and E individual members made last November when I enclosed one application blank asking that each member bring in one new member before June 1912. Many have responded and responded well, but the big majority have not as yet been heard from—Where are the co-operators? This campaign was gotten up with the thought in mind that the new Northwest Section would work hard before the Seattle convention to increase its size beyond that of the New England Section. We have the honor to be the largest Geographic Section of the National Association, and I am sure you all agree with me that we wish to retain that distinction. We must grow then, and can grow only by co-operation.

The Constitution and By-Laws of the New England Section have been revised and printed together with the Membership List and mailed to members; letters have been sent to Class A member companies asking their opinion as to the advisability of holding one or two conventions a year in New England; letters requesting catalogues and price lists have been sent to manufacturers of street lighting fixtures, and the catalogues are on file in the headquarters; a complete set of last fall's convention papers have been mailed to Class A and D members; several membership campaigns in Massachusetts were carried on by mail; letters with enclosures securing data on charging stations were sent to Class A member companies in New England; Question Box clippings sent out each month to members for answers; the preparations in detail for this convention carried out; and since the first of this year additional work in connection with the Luncheon Club Branch, with its mailing list of over 1800 names, the correspondence, care of printing weekly notices and return cards, handling of finances, etc., etc. It is certainly pleasing to see the enthusiasm expressed and the results in attendance at the weekly gatherings, with an average of 300.

The membership of the Section is steadily increasing, there having been 67 additions since the first of the year; 3 Class A; 54 Class B; 3 Class D and 7 Class E. We had the misfortune to lose quite a large number of members in one plant this year owing to a change in the management of the plant and a change in the policy of the company, but we hope many of these men will be regained in our membership.

On motion, the report of the Secretary was received and filed.

PRESIDENT SANDS. Next is the report of the Executive Committee.

REPORT OF THE EXECUTIVE COMMITTEE

of the

NEW ENGLAND SECTION NATIONAL ELECTRIC LIGHT ASSOCIATION.

Since the last annual meeting of the New England Section, the Executive Committee, which consists of the officers and six members, representing busy Central Station men, have held nine meetings with an average attendance of six.

This Committee have given much time and thought in acting upon the plans for holding two conventions with the presentation of four papers at each convention; the revision of the Constitution and By-Laws; the Rate question in New England; the matter of holding one or two conventions a year in New England and the organization of a Luncheon Club Branch.

On motion, the report was accepted and placed on file.

PRESIDENT SANDS. Next is the report of the Treasurer.

REPORT OF THE TREASURER

WELLES E. HOLMES.

Springfield, Mass., March 22, 1912.

To the Members of the New England Section of the National Electric Light Association:

GENTLEMEN:—I beg to submit the following report for the year ended December 31, 1911:—

RECEIPTS.

January 1, 1911, Balance of cash on hand . . .	$166.61
Feb. 6, 1911, Rec'd from N.E.L.A. advance on dues	500.00
May 6, 1911, " " " " " " " " "	1000.00
Aug. 26, 1911, " " " " " " " " "	1000.00
Dec. 6, 1911, " " " " " " " " "	150.00
Total	$2816.61

EXPENDITURES.

As per receipted vouchers, ...	$2730.25
Balance of cash on hand January 1, 1912 . .	86.36

President Sands. Before taking any action on this report, I should like to ask whether there are any questions that any member would like to ask regarding it?

There were no questions and the report was accepted and placed on file.

The President appointed the following committees:

AUDITING COMMITTEE.

Mr. H. A. Gidney of the Malden Electric Co., and Mr. David W. Beaman of the New Bedford Gas & Edison Light Co.

NOMINATING COMMITTEE.

Mr. E. P. Rowell, Plymouth, Mass.; Mr. E. M. Addis, Brattleboro, Vt.; Mr. J. H. Wilson, Berlin, N. H.; Mr. C. A. Mixer, Rumford Falls, Me.; Mr. E. R. Davenport, Providence, R. I.; and Mr. Fred D. Adams, New Haven, Conn.

President Sands. We will now listen to a paper on
"LOAD FACTOR AND POWER FACTOR—HOW TO IMPROVE THEM."
by Mr. L. L. Elden of the Edison Electric Illuminating Company of Boston.

LOAD FACTOR AND POWER FACTOR—HOW TO IMPROVE THEM

By L. L. Elden,

The Edison Electric Illuminating Co. of Boston, Mass.

The development of successful electrical supply systems involves a careful study of the relations between the actual connected load and the average and maximum use of the connected load. These factors determine the investment required in generating and distributing equipment and, in a large measure, are the factors involved in the adjustment of rate schedules.

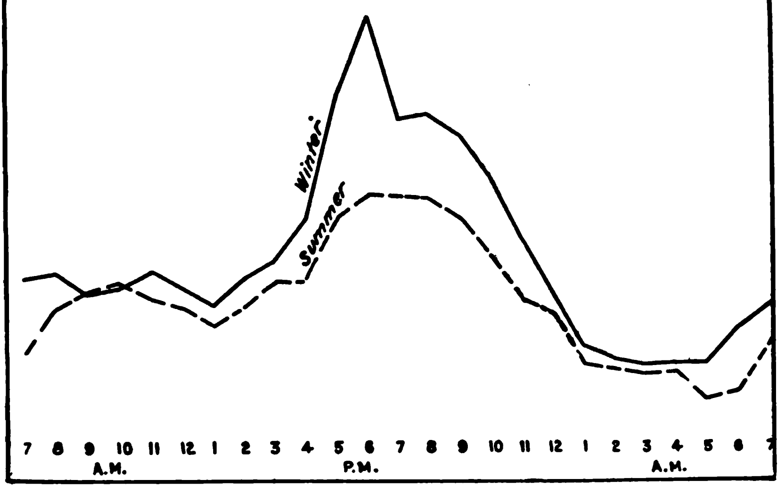
Experience has shown that the yearly maximum load of systems supplying mixed lighting and power service ordinarily averages not to exceed approximately one-third of the connected load, this representing the natural diversity factor of the many classes of consumers usually served by such systems.

Government statistics indicate that the actual load factor of the combined lighting plants in the United States averages under 25%, with but slight change for the better in the last ten years, and in fact there appears to have been but little improvement in this respect over a much longer period. There are naturally certain locations where exceptionally favorable conditions have resulted in the development of high load factors, through the combination of existing business interests, or where the exploitation of certain classes of service has achieved results much more favorable than those shown by the average system.

In referring to average systems the writer has in mind the load factors shown by systems supplying suburban towns or district where requirements for lighting predominates; also systems serving cities or metropolitan areas where large amounts of energy are required for miscellaneous power and lighting purposes. To illustrate the difference in load factor between such systems we may refer to Figs. 1 and 2, which show typical summer and winter load curves of suburban and city districts. A study of these curves indicate plainly the factors which make attractive the combination of such systems, that is, reduced fixed charges and operating costs for the combined system, by taking advantage of the improved load factor. As a general proposition improvement in the load factor of existing systems may be accomplished in two different ways. First, through combination with other properties whose load curves do not coincide; and second, by improving the load factor of individual customers either by agreements covering special hours of operation or through improved methods of operation. We are all familiar with the individual efforts of various central station companies to improve the load factor of their systems by offering special inducements to certain classes of consumers. In a number of instances particularly favorable rates have been offered those consumers who so arrange their working hours that their use of energy will not coincide with the maximum load of the supply system,—in other words, inducements are offered for the so-called "off peak business." The acquisition of such consumers is of undoubted value to the central station company, due to the improvement in load factor, and fortunate indeed are those consumers who are able to avail themselves of such special consideration in the face of the ever increasing difficulties in the labor situation.

Fig. 1

LOAD CURVE OF A TYPICAL SUBURBAN DISTRIBUTION SYSTEM



It is not the writer's intention to discuss the advisability of creating "off peak rates," as that is a matter to be decided on its merits by each and every supply company according to their local conditions. It may be noted that this has been done by several central station companies with apparently satisfactory results, although the success of such rates is dependent upon the nature and volume of business served by such systems.

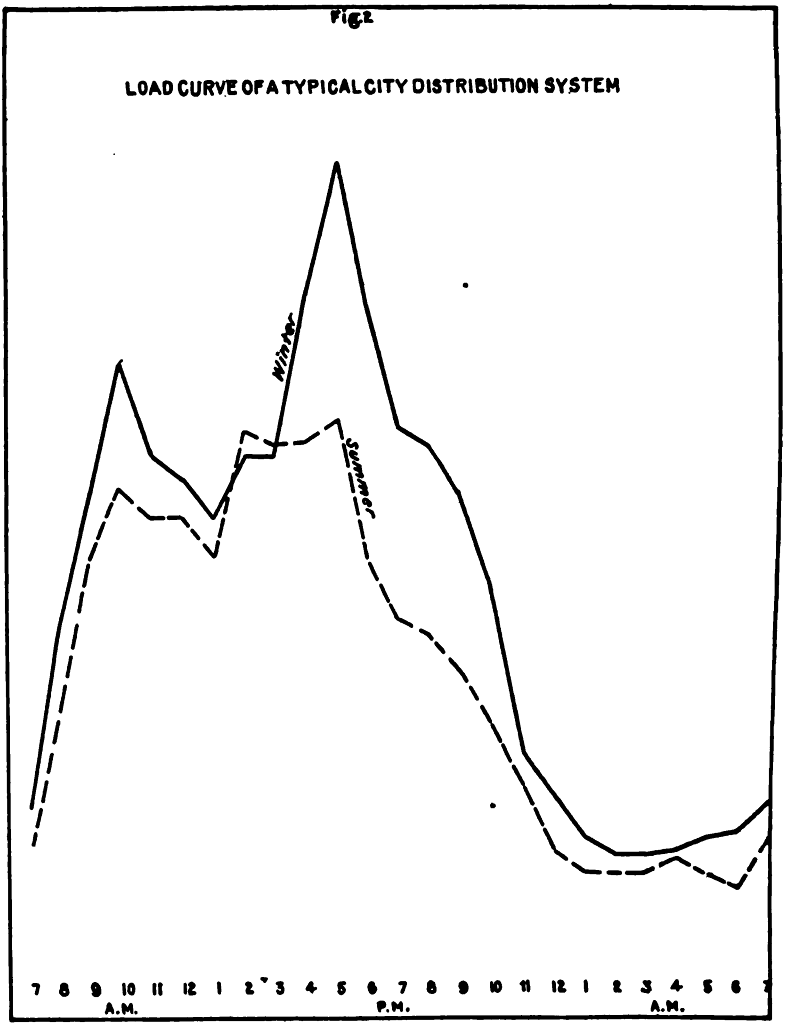


Fig. 2

LOAD CURVE OF A TYPICAL CITY DISTRIBUTION SYSTEM

Other companies find it profitable to exploit side issues, such as ice-making and refrigeration, as a means of improving load factor. These processes are particularly adapted to the development of "off peak business," as the use of power in these operations may be discontinued for considerable periods to avoid the system peak load without detriment to the business. This is particularly true of the absorption process, which can be so favorably applied to many such installations using electrical energy.

The recovery of nitrogen and oxygen from the atmosphere through mechanical and electrical processes are relatively recent developments of the use of electricity, which are possibly susceptible of adjustment to conform with the requirements of "off peak business."

The application of electricity to farming implements bids fair to develop an attractive "off peak business" under natural conditions, without the necessity for special inducements. Farming operations involving the use of power, if not actually avoiding peak hours, may usually be easily adjusted to do so without affecting the farmers' interests.

Irrigation undertakings, purchasing power for the operation of pumping machinery, are suggested as a favorable class of service of interest to electrical supply systems, owing to the ease with which their use of current may be arranged for "off peak service."

It is obvious that, in addition to the typical cases just cited, there are many similar opportunities for the development of high load factors through a study of desirable applications for the use of electrical energy.

Unfortunately, all users of central station service either cannot or will not adjust their movements to the advantage of the supply company, and the persuasive abilities of sales organizations must, therefore, be employed to develop such measures of success as are possible. The importance of an effective sales organization, which appreciates the broad principles of investment and operating conditions obtaining in a central station system, cannot be over-estimated. While in the natural course of events a certain amount of business presents itself for connection to the distribution system of every company, there still remains the selection and solicitation of the more important and remunerative business. It is in this particular that the sales organization has an opportunity to exercise the fine discrimination necessary in the selection of the most profitable classes of service.

It has been suggested that to illustrate the importance and desirability of certain classes of business, it is desirable to keep before the solicitors the load curve of their system that they may study the low parts of the curve and search for business best adapted to fill those portions, without affecting the maximum peak in like proportion. Further, a general knowledge of the investment required for different classes of service should properly impress the solicitor of the undesirability of some lines of business as central station consumers and, in a measure, restrain the oftentimes too strenuous effort to increase the connected load equivalents without due regard to the consequences to the system in general.

In a measure the sales organization of a central station company may be classed with the industrial engineer so often resorted to of late by manufacturers in an endeavor to increase their output and earnings, which is simply another way of expressing load factor.

In referring specifically to the sales department, it is for the purpose of calling attention to their importance in our business, dealing as they do with the elements which, when grouped together as a unit, develop a certain diversity factor of demand and in a measure indicate load factor possibilities.

Power factor, while a factor of extreme importance in its influence upon the operation of a supply system, has only recently been forced upon the consideration of the sales agent as another feature to be considered in making contracts with consumers.

In what has been said the writer has been dealing with generalities, and so much has been written by others on this subject that it is difficult to approach if from any new angle. As the improvement in load factor is such an important consideration in the distribution of electrical energy it will perhaps not be amiss to refer to the results obtained in certain installations with which the writer is familiar, where the principal end to be attained was a high load factor and a low demand. In referring to these installations both power factor and load factor will be considered, as in alternating current supply the two are in a measure correlated.

The diversified service required by the modern department store affords many opportunities to develop good load factors by careful consideration of their methods of using power. Aside from general lighting requirements in such stores there remains the power requirements for elevators, refrigeration and cold storage, ventilation, air compressors for cash carriers, pumping machinery, vacuum cleaning, refuse destructors, coal conveying, etc.

Analyzing the required use of power for these various purposes, it develops that by selecting a suitable system of refrigeration, all consumption of power for this purpose may be avoided during the lighting peak without in any way affecting the value of the system. In cold storage vaults depending upon power driven fans for air circulation over cooling surfaces, this circulation may regularly be discontinued during peak hours for considerable periods.

Ventilating systems involving the use of power for driving fans may either be discontinued or reduced in capacity during peak load periods without effect upon the business, as in modern installations the practice of making very frequent changes of air is noted.

A pumping unit of the centrifugal type arranged to be driven either by steam turbine or electric motor, has been found economical from all points of view in the supply of service for hydraulic elevators in one department store served from a central station system. With this arrangement the pumps are driven by the steam turbine during the heating season, the exhaust steam being delivered to the heating system of the building with the result that there is no demand on the electric system during the heating season of seven months each year. During the remaining five months the same pumps are driven by the electric motor, the whole cycle of operation effecting a substantial gain in the customer's load factor when compared with the usual installation for similar purposes. The requirements for vacuum cleaning, coal conveying, refuse disposal, restaurant lighting, and dumb waiter service in department stores, naturally fail to coincide with peak load hours, and if they did such use of power could in some measure be avoided by a study of its application.

The charging of batteries for pleasure vehicles has always been an attractive source of income to central station companies from the fact that most of the charging may be done outside of peak hours. With the advent of large numbers of pleasure and commercial vehicles, public garages for such vehicles have appeared requiring substantial amounts of energy for charging purposes. In general it has been unnecessary to make special provision for this class of service, as the charging is largely done off peak. One feature of this business requires mention as a means of improving load factor. It is customary for the operators at charging stations to start charging all vehicles as early each night as possible, thereby causing a high demand for service, whereas if only part of the vehicles are charged at a time there results a material reduction in the demand for energy.

In one case where the construction of a large electric garage was under consideration, it was estimated by the owner that 800 kilowatts would be required as a maximum demand for charging purposes. Investigation of proposed operating conditions by the central company's engineers developed the fact that the garage owners were proposing to charge all vehicles simultaneously. It was shown that the garage operators would have at least 12 hours each night to carry on the charging, and that by arranging to charge a part of the vehicles at a time and thus carry on the charging continuously, it would be easily possible to complete the charging of all batteries each night without creating a demand in excess of 200 kilowatts, and at the same time avoiding the system peak.

In charging stations using substantial capacities of series resistances for controlling charging currents, a very considerable saving can be effected in the maximum energy used, by arranging to connect a certain number of similar batteries in groups during a portion of the charge to take up the total system voltage, thereby eliminating in some measure the losses in resistances.

There is probably no class of service more susceptible of load factor improvement that battery charging, and when energy is purchased under a demand system of charging, the opportunity for complying with off peak rate conditions are particularly favorable to both consumer and supply company.

The load factor of those systems furnishing street lighting service under the so-called moonlight schedules may be materially improved by soliciting all night service under most favorable conditions to all parties. We may note recognition of this principle in all rate schedules for street lighting wherein the total increased expense for all night lighting on the moonlight schedule is usually a very modest amount when compared with the cost of a short hour moonlight service.

One point rarely, if ever, considered in the frequent comparisons of street lighting prices in various localities, is the effect which changes in latitude have upon the lighting schedules in avoiding overlapping of the peak loads of various classes of service. Comparing conditions in Portland, Maine, and New Orleans, a difference of thirty minutes is noted in the setting of the sun. This is sufficient to prevent the overlapping of commercial and street lighting service peaks, thereby eliminating the fixed charges representing generating apparatus for street lighting service and making it possible to profitably supply service at a materially lower rate in New Orleans than would possibly be the case in Portland, other things being equal. The lower cost becomes possible through the improvement in load factor due to non-overlapping of peak loads, thus creating a greater diversity factor in the South than in the North.

The manufacture of cutlery and particularly of safety razors involves the employment of special tempering processes in the preparation of cutting blades for such razors. One manufacturer whose name is almost a byword among men, installed an extensive tempering process requiring large amounts of electrical energy for heating the tempering furnaces. These furnaces were constructed as individual units, each requiring approximately 30 kilowatts demand for one-half hour to raise the furnace to a proper temperature, after which a consumption of 12 kilowatts per hour sufficed for the continuous operation of each oven for the tempering process. For a long period it was customary for the operator to start all of the ovens at one time, thereby involving a high initial demand for energy, and a lower demand later for continuous operation. Energy being purchased from a central station company on a demand basis, it naturally followed that the charges were high. Wishing to add additional furnaces, the central station's representative was asked to consider the installation and submit rates applying to the complete installation. It was speedily found that a continuance of the existing method of operation would result in a rate unattractive to the manufacturer on account of the high demand charges, notwithstanding the installation showed a good load factor. A suggestion was made that the furnaces be started earlier in the morning, so arranging the schedule that all would be ready for service at 7 A. M. when the factory force arrived. Upon this basis, experiments showed that by delegating the night watchman to commence to start the furnaces on a prearranged schedule, the then existing demand for one-half the total proposed number of furnaces would successfully care for the total installation. The result to the consumer was a most favorable rate, and to the Company a volume of business almost double that formerly supplied, with a load factor of almost 100% without requiring any additional generating and distribution investment. This installation is particularly good from the fact that its operation develops a power factor approximately 95%, a result reflecting great credit upon the designer of the furnaces.

A certain manufacturer of rubber goods, upon considering the adoption of central station service, was invited to give careful consideration to arranging his manufacturing process to improve his load factor. Although well established processes of manufacture were in force, a study of the situation was made and a plan of operation adopted involving great departures from existing methods. Operating twenty-four hours daily, six days per week, it was found advantageous to make certain processes continuous instead of irregular, thereby producing almost an even consumption of power.

Preliminary trial motors were used to ascertain the amounts of power required for each unit, and in this installation the particular attention given to group drive arrangements has shown excellent results, both in power factor and diversity factor conditions.

The application of power to the rubber mills, and the development of a schedule for loading the mills is particularly worthy of consideration, in that practically a straight load line results from their particular use. This is in contrast to general practice elsewhere in similar lines of manufacture, where the ordinary employee is allowed to conduct such operations in an extremely wasteful manner as regards consumption of power.

This installation comprises 1295 H.P. of induction motors developing an average demand of 225 KWs. and a maximum demand of 490 KWs. at 85% power factor. The load factor approximates .615%, indicating the extremely economical use of such motors as are in service.

The plant of the Walworth Manufacturing Co. of Boston is quoted as an example of high-grade engineering, showing what can be accomplished by active co-operation between consumer and supply company.

Operating a manufacturing plant, including casting, forging, and machining processes, the electrification of this company's plant afforded opportunities for making either a good or a poor installation.

This company, previous to electrifying their works, operated a small direct current plant for lighting purposes, also for the operation of certain variable speed tools, but had little or no experience with motor driven tools. Soliciting assistance and information from the Edison Company, the desirable features of a shop installation were laid before them and particular emphasis placed on suggestions pertaining to load factor and power factor, the first for rate purposes and the last to conserve investment in transmission lines, transformers and wiring. Without going into too much detail, it is sufficient to add that the policy of obtaining a set of trial motors was adopted, and each motor installation made and tested out with its load, following which a motor of proper size was ordered and permanently installed.

In the study of operating conditions so important under a demand system, it was found that a change in the method of handling the cupolas would be beneficial, and therefore a continuous pouring system was adopted, making the demand for the blowers continuous with only a maximum demand representing one blower motor. Again upon installing air compressors means were found to obviate the heavy starting currents developed by induction motors operating such apparatus. Air pressure being always available, it was found convenient to start an idle pump by admitting air to the cylinders, thereby bringing the pump and its motor up to speed, when the motor could be thrown on the line without a noticeable rush of current. These and other features which have been worked out in this installation, have tended to improve the load factor immensely, thus conserving equipment to a tremendous degree.

This installation as finally completed to date, comprises 43 induction motors, aggregating 1129 H.P. and one synchronous motor of 95 H.P., making a total of 1224 H.P.

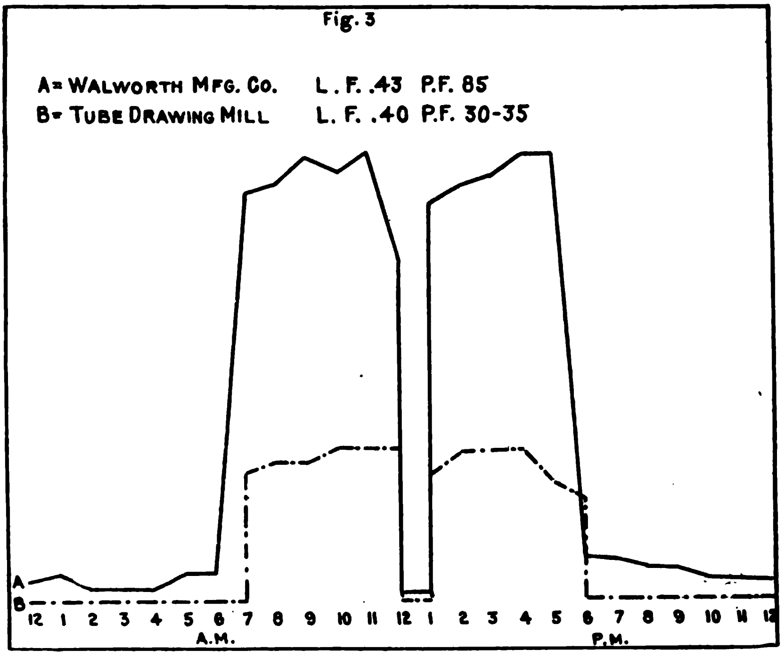
The excellent results obtained may be appreciated when it is stated that the average demand over 24 hours is 221 KWs., maximum demand 720 KWs.; load factor 43%, and power factor 83%.

The excellent results accomplished in some of the installations referred to are shown in Figures 3 and 4, where typical load curves of their use of energy are shown and marked for identification.

The load curve B in Fig. 3 is referred to later in the paper under the discussion on power factor.

In Fig. 5 are shown yearly maximum load curves of a metropolitan lighting system and a street railway system

Fig. 3



serving the same district. The combination of such utilities, or at least the sale of power by lighting companies to railway companies, is now a favored method of improving the load factor of lighting systems.

The economies effected by such sale of power are apparent, as an inspection of the curves reveals a substantial diversity between the peak loads of each system, in that the peaks do not coincide.

Further, the combined load curve of the two systems indicates possibilities for substantial reductions in the cost of operation due to an improved load factor on the reduced amount of generating equipment required for the operation of the combined system.

All of the above deals with improvements in the load factors of transmission lines—transforming equipment and distributing systems which are of equal if not greater importance than improvement in load factor of generating apparatus from a monetary point of view. Although the effect of improvements in customers' operating conditions have been specifically referred to as a means of accomplishing this end, there remains an exceptionally favorable opportunity to improve the load factor of combined railway and lighting transmission systems by the use of combination sub-stations for lighting and power distribution. By the use of modern automatic regulators on A. C. distribution circuits it is now possible to satisfactorily operate both forms of service from the same transmission line, thus taking advantage of the power factor correction characteristics of railway converters or motor generators, to compensate for the low power factor loads usually resulting from A. C. power supply. Operation under such conditions results in a high load factor on the transmission system, thereby materially increasing the capacity of the system over what it would naturally be if the systems were operated separately.

Without going into too much detail, there follows brief mention of a number of classes of service which, if secured, materially improves the load factor of almost any system—and, in most cases avoids the peak load period.

Town and city water pumping systems, particularly when operated in connection with storage reservoirs of sufficient capacity to permit pumping to be discontinued for considerable periods each day, is a class of service to be acquired whenever possible.

Water pumping for irrigation systems affords excellent opportunities to improve load factor, and may easily be arranged for off peak operation.

Sewerage pumping under conditions which call for continuous service should be a class of service eagerly sought.

Government construction work is ordinarily limited to an eight hour working day, therefore, such power as is used, automatically avoids the heavy load periods each day, and in the Northern states such work is frequently discontinued in the winter, thereby avoiding usual winter peak loads.

Quarrying and stone cutting operations continue to require larger and larger amounts of power, as the work is speeded up by the introduction of tools operated electrically or by

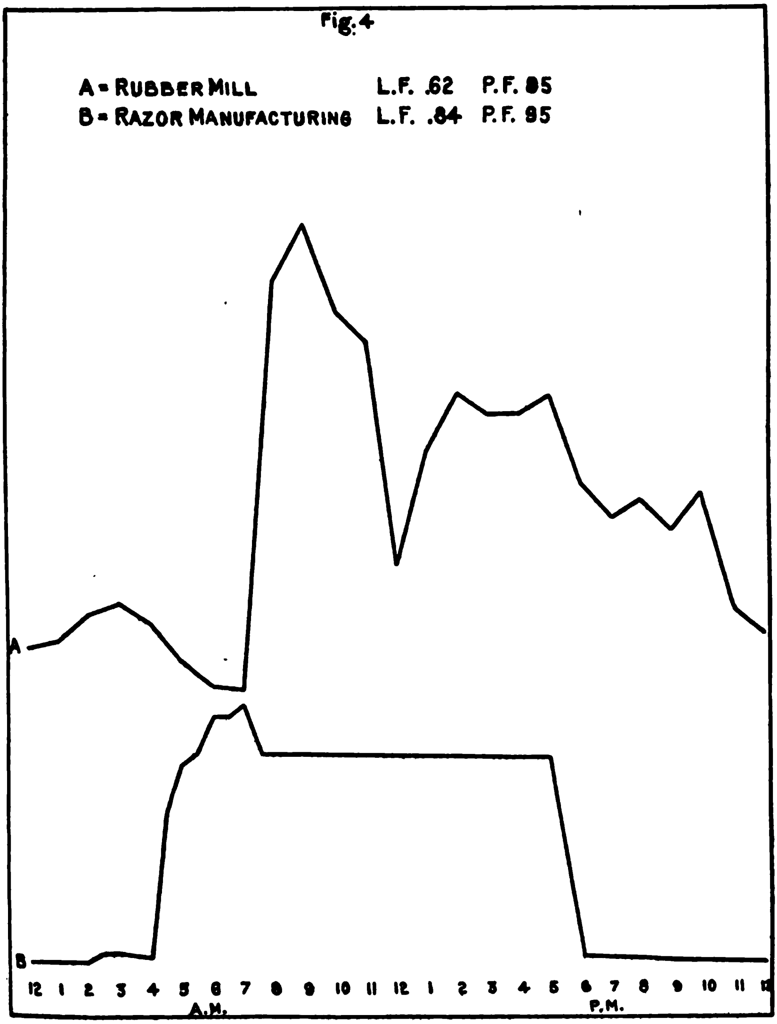


Fig. 4

compressed air. This class of service is very valuable to the central station from the fact that such work usually ceases sufficiently early to avoid the evening lighting loads the year around.

Bakeries ordinarily perform all their power consuming operations during the late evening or early morning hours and are therefore desirable customers.

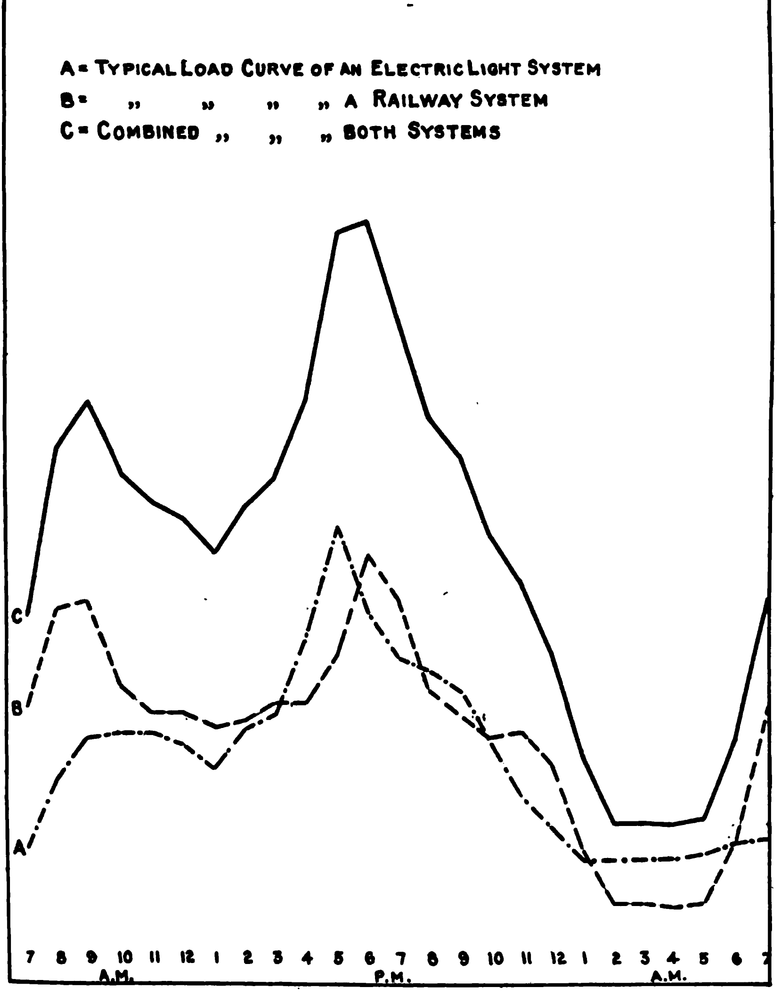
Lighting of public halls and churches where reasonably frequent use is made of such facilities shows many favorable results of late. In this connection night schools may be considered as a form of service to be solicited, for, when such schools are in use each evening through a season, their load factor is far superior to ordinary house lighting, and is at all times off peak load hours.

The tremendous latent possibilities in the application of electricity to farming operations should engage the serious attention of every central station organization. From the very nature of farming work there cannot fail to be a high diversity factor developed during the summer months when such work is at its height, while in both winter and summer the greatest requirements for power occur at periods which do not coincide with the lighting load in such districts. It is entirely safe to predict that in the near future active solicitation of this class of business will be made and, in fact, at least one company is now preparing for a campaign of education among the farmers along these lines during the coming year.

Recent developments in large size hot-water heaters suitable for use in connection with hot-water circulation for heating purposes, indicate that the only requirements for their general use is a suitable rate for energy on an off peak basis. The stored heat in such systems will permit the actual discontinuance of the consumption of current for specified periods each day, or at least the use of current may be materially reduced to avoid maximum use during peak load hours. Should the off peak principle of charge for current become universally recognized the heating of dwellings electrically will become a most productive source of income, particularly as thermostatic devices will afford simple methods of regulation, and if necessary time clock control of two rate metering will insure against use except under prescribed conditions.

It is often advantageous to secure from private plants such of their business as can be operated during the summer months, without extension to the distributing system of the

Fig. 5



central station company. It frequently occurs that even though some private plants supply steam and hot-water service the year round, arrangements may be made for supplying such service during the summer in other ways in conjunction with electric service to make the entire transaction profitable to all parties.

Summer resorts and amusement park lighting are particularly attractive forms of business from the relatively long hour use of such service, and non-coincidence of this demand with that of the central station peak.

Summer sign lighting is a satisfactory class of service due to its long hour use.

Paper mills from the very nature of their processes require power service continuously over long periods, usually twenty-four hours daily for six days each week. Such installations cannot fail to develop a most satisfactory load factor, and the power factor of such service should also be satisfactory if the motor installation is properly designed.

If not familiar with the power service required by tanneries, such service will upon investigation prove to be very attractive to central station operators. Processes employed in curing hides require the continuous use of substantial amounts of power for long periods, making an ideal load factor for any supply system.

One company has recently undertaken to supply energy for the operation of a section of the signal system of a large steam railroad, under conditions which develop the much desired load factor of 100% calculated on a full yearly basis of 8760 hours.

The minute quantity of energy required for a single telephone message naturally does not attract our attention to the actual power requirements of each telephone exchange of reasonable capacity. Upon investigation the supply of both power and lighting service to telephone systems will be found both attractive and profitable owing to the almost continuous use of such service the year round.

The use of electrically operated household appliances materially adds to the improvement in load factor even though the units are so small as to be sometimes not appreciated. Fans, flat irons and laundry devices scarcely ever receive the credit they deserve, yet they materially add to the consumption of current. One company which has kept a close record of the use of electric irons by its consumers finds that the average income per consumer amounts to $6 per year, a result well worthy of consideration as indicating some assistance in load factor improvement.

When the time comes that a favorable rate for cooking purposes can be offered for both regular and off peak use, then extensions and additions to our distributing systems will be required to meet the resulting demand for service. The natural use of cooking ranges, or even the electrically operated "fireless cooker" largely conforms to off peak business, and with the tremendous volume of such business that can be secured with suitable rates the earnings and load factor of our stations will be favorably affected.

A number of the states comprising our great country are actively engaged in the extermination of gypsy moths each year, using methods that are at the best exceedingly costly and in some instances ineffective. When the moths reach the flying stage of their development, they have all of the predilection of the moth for brilliant light and are strongly attracted thereto. It is suggested that the example of our European contemporaries be followed in using powerful electric lights to attract the moths before suction fans, whereby large quantities of the moths are destroyed before reaching the age when they are destructive to foliage. Although probably not requiring large amounts of energy for operating such schemes, still, if effective, some benefit to the load factor must result, and in addition a certain amount of excellent advertising will be secured.

We may note a number of classes of lighting service which if secured materially add to the load factor due both to heavy and long hour use.

Hotels, restaurants, saloons and drug stores contribute materially to improving the load curve and will always do so as long as the prevailing habits of living continue.

Amusement enterprises such as theatres, pool and billiard rooms, bowling alleys, etc., usually require their maximum demand for lighting purposes outside of peak load hours under conditions favorable to the supply company.

Lighting of entrances, halls and corridors of apartment buildings under the control of the owners of such buildings furnishes reasonably long hour use of the demand throughout the entire year. The endeavor of many owners of apartment-house property to improve the appearance of their property, has taken the form of special post lighting in small private park areas and along walks and approaches to such buildings, which as operated develop 20-25% load factor.

Livery stable and garage lighting from its long hour use is capable of showing substantial returns and should be considered as of material advantage to supply.

Lighting of railroad stations and yards produces a straight line load curve during the hours of use with a resulting high load factor.

The foregoing selections of classes of desirable service have been selected at random among many other equally desirable adaptations of the use of electric service, and while many references have been made to their adaptability to off peak service it should be understood that the writer has not intended to suggest that such business should not be acceptable under regular conditions.

At this point it seems fitting that some of the undesirable classes of service be briefly referred to, some of which our systems would be better off without—particularly certain forms of alternating current supply involving continuous losses in transforming apparatus without adequate return as compared with those in direct current systems.

Winter holiday lighting operated for only short periods usually makes an undesirable increase in the peak load of a system, and if fairly considered, does not show a satisfactory return but rather a loss on the investment and operating charges necessary for the supply of such service, disregarding entirely the effect on the load factor.

Cranes, hoists and whips, owing to their irregular use and the heavy rushes of current required in their operation, are decidedly unsatisfactory energy consuming devices from the load factor point of view.

Electric welding apparatus lies in the same class and requires special consideration before connection to a general distribution system in order to accomplish satisfactory metering of their use of energy.

The effect of welding apparatus on a system is usually severe, due not only to the poor load factor, but to the low power factor which it develops.

Wireless telegraph equipments add nothing to the system load factor and are very undesirable consumers.

In the preparation of this paper no attempt has been made to discuss the effect of varying load factors on the cost of production and distribution, it being evident that the effect of such changes will vary in each system according to local conditions and type of plant.

In a paper presented by Mr. Stott before the A. I. E. E., in 1909, the effect of varying load factors on generating costs was exhaustively treated, and the following conclusion reached for different types of prime movers under certain assumed conditions of fixed charges, fuel and labor costs.

TABLE SHOWING REDUCTION IN YEARLY COST PER GENERATED K. W. H. BY INCREASING IN LOAD FACTOR FROM 20 TO 100%.

Hydraulic Plants	65%
Reciprocating Engine Plants	57%
Steam Turbines	60%
Reciprocating Engine and Low Pressure Turbines	60%
Gas Engines	65%
Gas Engine and Steam Turbine	64%

It should be noted that Mr. Stott's conclusions refer only to effect on generating costs where the assumed fixed charges are about one-fourth to one-sixth those incurred in the distribution system, from which may be easily understood the desirability of studying the problem of improving the load factor primarily from the consumers' end of the system.

Assistance rendered the customer in the selection of proper motors and method of installation whether for group or individual drive, suggestions of methods of operation with regard to hours and other similar considerations, may be considered as the most fruitful means to be employed by central station interests in improving the load factor of their systems. Central stations may look forward to a further improvement in the load factors developed by manufacturing establishments, due to the agitation for an eight-hour day. When such hours of labor become established the characteristics of the load curves of both lighting, power and railway companies will be favorably affected.

POWER FACTOR—

The term power factor, so little understood in the early days of alternating current supply, even today may fairly be considered as the greatest bugaboo ever coined for the mystification of consumers using that form of energy.

Its importance is scarcely second to that of load factor in its effect on investments for generating and distributing systems, and therefore properly deserves careful consideration in making contracts for service and the development of rate schedules. The demand system of charge so widely recognized and used in our business today and so successfully applied to direct current supply, utterly fails when used as the only basis of charge for alternating current service where the power factor falls below 100%. No system of charge has been developed within the writer's knowledge which properly takes into account the difference in operating conditions involved in the supply of direct or alternating current.

To illustrate the need of serious attention to all contracts for the supply of A. C. service, we may consider a supply system designed to operate at 100% power factor. A consumer or a number of consumers requiring power service are connected to the system causing the power factor to fall to 75% or lower with no visible means of correction, that is, there are no favorable conditions permitting the use of a synchronous condenser for corrective purposes. The capacity of the plant is thereby reduced 25%, and investment charges must of necessity be increased in like proportion on the actual effective capacity of the system, a result unfavorable to both consumer and company as regards future adjustments of rates. The writer has long contended that power factor should have some recognition in rate making for A. C. supply in order to prevent the very evident discrimination in the usual system of charging when the same rate per K.W.H. is charged for both A. C. and D. C. service.

Last year, in a discussion before this Association on Mr. Mosman's paper on Synchronous Condensers the writer somewhat pointedly indicated some of the causes for the trouble central stations experienced from low power factor. With the experience of another year to judge from it is still apparent that the tendency to use motors too large for the duties they are to perform, is still a considerable factor in accounting for low power factor conditions. The central station must still look to the manufacturer and vendor of A. C. motors, as the most important factor in assisting to improve its power factor without having to resort to auxiliary apparatus such as synchronous condensers, to save its investment at the expense of increased cost of operation. The fact remains that sales of A. C. motors are made to customers without due regard to their effect on the supply system when placed in service, with the result that the central station is compelled to choose in some cases between bad business or none at all.

In support of this contention the report of a large central station company who recently investigated the maximum demands of 3900 power consumers with installations aggregating 35,000 H. P. is of interest.

Max. demand of installations 1- 5 H.P.—75% of connected load
" " " " 6-10 " —65% " " "
" " " " 11-20 " —65% " " "
" " " " over 20 " —43% " " "

The art to date has produced the synchronous condenser as the only commercial form of apparatus suitable for power factor correction, omitting from consideration the favorable conditions of sub-station operation where it is possible to combine different classes of business, such as railroad service using rotary converters in connection with lighting systems where control of the power factor is accomplished as previously described.

The commercial use of condensers is naturally limited to sub-stations where they may be used to improve the power factor of transmission and transforming systems, or they may preferably be used on the premises of consumers to correct low power factor at such locations.

While admitting the improvement in power factor which results from the use of condensers in both cases, it is still an open question if it is desirable to accept at regular rates, a class of business requiring the unusual investment and operating charges necessitated by providing a condenser for installation on some particular consumer's premises, to correct the unnecessary or unavoidable low power factor conditions created by his equipment.

A case in point is the supply of service to a consumer operating a large electric furnace of the arc type, developing a power factor of 60-65% and requiring widely varying amounts of current for its operation, thereby causing heavy fluctuations in line pressure. To accept such a consumer at the same rate that would be accorded a user of similar amounts of energy at 90 to 100% power factor would be manifestly unfair. If, however, the user of the furnace provides and operates a synchronous condenser at his expense to improve his power factor and reduce line disturbances the proper solution of the matter is reached.

It is this course that should be pursued in dealing with large consumers whose apparatus develops power factors below 80% when connected to a supply company's system, or else suitable additions to the regular rates should be made to compensate for the unfavorable conditions under which service is supplied.

A very striking example of the effect of low power factor on a large system recently came to the writer's notice. The plant in question was situated in a mining district, and as its principal business supplied power almost exclusively for mine hoists, ventilating and pumping equipment, tramways, ore crushers and other similar mining operations.

The maximum load on the system averaged about 50,000 KW. with a load factor of about 30%, at a power factor of approximately 65%. The wattless K.V.A. circulating in the system aggregated 27,000 K.V.A., a generating and distributing capacity absolutely without earning power, and in fact a constant source of loss through the circulation of idle current in the lines and transforming equipment. Capitalizing the useless generating capacity alone at the usual price of $100 per KW. an enormous investment is shown.

This whole situation resulted from the connection of a very large capacity of underloaded motors with no provision for power factor correction, through the use of synchronous motors in certain of the power consuming operations.

In this installation, it so happens that the individual motors are necessarily of large capacities in order to perform their respective duties, yet the briefest consideration of their use, shows that a substantial number of the motors in use at each mine might have been of the synchronous type. If such had been the case the system would be enabled to operate at high power factor, conserving not only the supply company's generating and transmission line capacities, but the customer's transforming equipment in like proportion.

A certain tube mill with an installation of 1200 H.P. of induction motors develops an average demand of 120 KWs, and a maximum demand of 260-300 KWs., a load factor of 40% at a power factor at 30-35%. As the demand averages 900 K.V.A., similar transformer and line capacities are required to supply the service, and in addition heavy regulating devices are necessary to compensate for the losses in lines and transformers. Various attempts have been made to improve these conditions by changing certain large induction motors to synchronous motors or to install a condenser on the customer's premises, either method affording means to raise the power factor.

Failing to find any acceptable method of making such an installation on the customer's premises, a condenser was installed at heavy expense in the near-by sub-station in order to conserve the investment of the central station in transmission lines, transforming and generating apparatus. This condenser develops a demand of 60KWs., an operating expense justified on the part of the supply company to improve the condition of its system, but not justified on account of a single consumer paying regular rates.

Another feature of the operation of this consumer's apparatus is shown by the load curve marked B in Fig. 3. The load factor of 40% which is developed, would ordinarily be very satisfactory were it not for the unfavorable conditions caused by low power factor; and it is on that account that consideration should always be given to power factor as well as load factor.

This installation was made under the advice of the engineers of a manufacturer of electrical apparatus, and while excellent in mechanical arrangements, can scarcely be considered a satisfactory consumer at regular rates, and in fact the actual conditions are the reverse.

Experience with alternating current motors suggests that the use of underloaded motors should be avoided. Group driving of machine tools is to be preferred to individually driven tools as a means of preventing low power factor, and at the same time improving load factors and reducing the capacity of motors required.

Motor installations involving frequent starting and stopping of motors, such as small pumping installations for house service, so arranged that the motor starts each time a faucet is opened in the water system, should avoided. Insist that a tank be provided of sufficient capacity to carry a considerable supply so that the pump will not have to start frequently. This plan will avoid the disturbances resulting from low power factor currents created by the frequent starting of such motors.

The operating characteristics of the standard forms of A. C. motors are generally well known, nevertheless it behooves the representative of the central station company to interest himself in the types of motors offered for connection. Oftentimes the power factor may be kept at a satisfactory point by selecting a particular type of motor for certain classes of service.

When considering the use of single phase motors the recent production of a motor of this type which develops high power factors under both starting and operating conditions should receive the careful consideration it deserves. The introduction of single phase motors of high power factor will facilitate small systems or in areas where polyphase service is not available.

The arrangement and capacities of distributing transformers as installed have an appreciable effect on the resulting power factor of a system. Strict attention should be given to the diversity between the many classes of service, and transformers installed accordingly. It has been found desirable and economical in large installations to provide means for cutting in and out of service such transformers as are not required for considerable periods thereby improving the power factor of such consumers' installations. The importance of reducing idle transformer current which ordinarily may have a power factor of 50%, can be appreciated by reference to the transformer installation of a large central station company. The complete installation of distributing transformers numbers 4000 transformers aggregating 30,000 KWs., create an instantaneous demand for core losses alone of 550 KWs. at approximately 50% power factor, equivalent to a demand of 1100 K.V.A. on both generating, transmission and transforming equipment. Failure to appreciate the results of indifferent attention to the proper installation of transforming units may easily lead to unsatisfactory operation as regards power factor.

In the following table there is noted the power factor developed by the principal types of A. C. apparatus usually served from central station systems, these figures in a measure indicating the serious factor conditions to be met with in general practice.

Incandescent Lamps	95%
Multiple Arc Lamps	65--70%

Mercury Vapor Lamps	50%
Polyphase Induction Motors	15--85%
Single Phase Induction Motors (various types)	85--97%
Single Phase Induction Motors (one type) starting	70%
Single Phase Induction Motors (one type) running	100%
Synchronous Motors	100%
Constant Current Transformers operating Series Incandescent Lamps	95%
Constant Current Transformers operating Series Arc Lamps	72--75%
Mercury Rectifiers operating Series Incandescent Lamps	95%
Mercury Rectifiers operating Series Arc Lamps	60--65%
Mercury Rectifiers charging Storage Batteries	70--90%

Omitting those systems including synchronous apparatus as a part of their distributing system, it is fair to say that:— in general, the maintenance of high power factor can ordinarily only be secured by careful consideration of each and every consumer's load. With the co-operation of all parties concerned, it is possible in the great majority of cases to agree upon conditions of operation reasonably satisfactory both to consumer and supply company.

President Sands. Gentlemen, I wish to offer a word of explanation as to why this most excellent paper was not sent out with the other papers which you received a few days ago. Printers are human and our printer fell down, so that Mr. Elden's paper was not received until this morning. However, the subject is one which is of vital interest to central station managers and power engineers, and I hope we may have a full and free discussion of the paper.

Mr. Macomber. This very able paper has brought most forcibly to our attention the importance of these factors on our station load and on operating conditions, and we are indeed indebted to Mr. Elden for his thorough treatment of the subject. Betterment of the load factor of our stations has been an all-important pursuit and familiar to all of us. I believe, however, that the question of power factor has been somewhat neglected. Of course, a good load factor means a better power factor, but a closer study of the power factor will show us where many improvements may be made. I believe one of the causes of the neglect of this matter is that there has not been an appreciation of the proper relation between the commercial end and the operating end. The commercial man has been interested in boosting his connected load, being desirous of connecting up as many motors of as large horse power as possible, with, in many cases, small regard for the engineering requirements, with the result of poor power factor and its attendant station troubles.

The best remedy for this situation is co-operation between the operating man and the commercial department in order that the needs of the consumer may be properly cared for and the engineering requirements properly met. I have in mind one station that offers a striking example of over-rated installations with the result that the power factor of the plant at times is between 50% and 60%, which means a very serious effect on economy. The use of synchronous condensers as a remedy for these troubles depends, of course, upon conditions, investment required, and the resultant economy obtained. While it is desirable to install such condensers at the source of trouble in order to obtain the greatest gain, there is considerable objection, except in unusual cases, to installing special machines on the customer's premises, particularly where the central station does not have control over their operation which at times is very desirable. I am sure that many of those present have had their troubles with this question of power factor and I hope that the discussion will bring out many of the points emphasized in this paper and particularly as regards the importance of the power factor.

MR. H. S. KNOWLTON. I think this section owes Mr. Elden a considerable debt for having brought out those cases of actual experience. So many generalities are handed out that it is very refreshing to hear a paper with as much detail as the one Mr. Elden has presented here. I wish he would be good enough to give us a few ideas on the question of the power factor of the individual drive as compared with the group drive. I realize, as we all do, that cases vary greatly, and in view of the interest there is nowadays in the individual drive, and the tendency in that direction, I should like to ask Mr. Elden what he considers to be the general effect on the central station of the increasing use of individual motors. It seems to be very desirable from the consumer's point of view, but is it as desirable from the standpoint of the central station—from the standpoint of the power factor and the load factor?

President Sands. Do you prefer to answer questions as they are asked, Mr. Elden, or to wait and answer all questions at the close of the discussion?

Mr. Elden. I should prefer to answer all questions at the end.

President Sands. At our last convention we had a most excellent paper on synchronous condensers by Mr. Mosman. When this paper was suggested, a desire was expressed by a number of members, who referred to Mr. Mosman's paper, to have the subject carried a little further, dealing with the commercial aspect. If Mr. Mosman is in the room we should be pleased to hear from him.

Mr. Mosman. Mr. Elden, as I suppose we all know, is a very busy man, and it seems to me the Association owes him quite a debt of gratitude for the amount of time he must have devoted to preparing such a broad and exhaustive paper. I had hoped to have a copy of this paper to read before the meeting, but was not so fortunate, as you all know.

Of course, the load factor end of this is the all-important part. If we attend to the load factor and arrange the loads and diversity factor, etc., so as to have a fine load factor, we will not have to worry much about power factor, as power factor will depend more on load factor than anything else.

The electrical apparatus that is available today, when operated at good load factors, will give sufficiently high power factors.

There is involved in this whole subject more or less of a contest between the consumer and the central station. From the consumer's point of view the efficiency of the apparatus is of prime importance. He doesn't care so much about power factor as the increase of the current load on the central station lines and apparatus does not interest him, and until the central station penalizes him by means of the rate, power factor will continue of little interest to him.

This paper puts great stress on the power factor without referring very much to the efficiency. It has always seemed to me that the point of most importance to the central station was not the power factor alone, but the apparent efficiency, which is the product of the efficiency and the power factor. This is the characteristic which directly controls the amount of current supplied by the generating apparatus and carried through the transmission lines, etc., and I think it has often been lost to view in the consideration of these matters, the great stress being laid on the power factor alone.

On page 21 Mr. Elden refers to the delinquencies of the manufacturers. All I would like to say on that is that we are doing the best we can. I think it would be very advantageous in the sale of apparatus which will constitute a large power load if the central station representative and the representative of the manufacturer could always get together with the customer and thresh out the entire question. The central station has entire control and guidance of the customer in the matter of the power factor of apparatus by adjusting the rate in accordance with the character of the apparatus he purchases and the load factor he proposes to have. This paper brings out many important instances of the exceedingly fine work done by the central station engineer in so guiding the consumer in his manufacturing processes as to secure a very high load factor, which in turn allows him to secure a low rate and a moderate charge.

Of course, in suggesting the synchronous condenser last year it wasn't the intention to encourage the arrangement of loads in any careless fashion so as to result in possible low load factor or low power factor, and then cure the trouble by the sale of a synchronous condenser. The idea was to suggest the use of a synchronous condenser only where other means had failed to produce a good load factor. If, by the use of the synchronous motor you can furnish from the same station a diversity of loads and obtain a good load factor and a good power factor, by all means do so. But, having done that, I, in spite of the best endeavors, still think there is a very wide field for the use of the synchronous condenser, and it would be very desirable if many consumers, at least, many large consumers, could be induced by means of adjustment of rates to buy a synchronous condenser and thus become a high power factor customer of the central station.

Considering the sales of small motors, it would not be possible for the central stations and the manufacturers' agents to get together over the sale of a five horse power motor in order to make sure it should not be a three horse power. There is where we must rely on the manufacturer's agent and the intelligence of the purchaser, and results show that we have done fairly well, although undoubtedly we can improve.

Referring to the paragraph at the bottom of Page 22, there is one thing we should bear in mind, and that is that if a system has a wattless load say of 27,000 K.V.A., that doesn't mean that the generating apparatus must be increased by that amount, but only that the amount which it must be increased depends upon a combination of that 27,000 with the energy component, so that the real difference between the energy component and the total will be much less than that indicated by the ratio between the wattless K.V.A. and the energy component.

There are many installations where very low load factors could be corrected by the use of flywheels; that is, a wheel directly connected to a motor supplying an intermittent load of very short active intervals, the motor having the characteristics of considerable slip, thus allowing the wheel to give out energy momentarily. This and similar arrangements are used in mining districts. The flywheel motor generator is an example: A comparatively small synchronous motor drives a large flywheel and a direct current generator, the motors on the hoists being direct current; the result is a load on the system of high power factor and a comparatively high load factor.

As to the paragraph at the bottom of Page 24, with reference to the intelligent installation of distributing transformers, I would say that undoubtedly by the exercise of some thought, power transformer banks may be installed for feeding a variety of loads.

I think there is nothing more I wish to say, except to express my admiration for the paper as a whole.

Mr. Mixer. There need be no apology for the reading of the whole of this paper. I do not know what part of it might have been omitted—certainly not that about power factor.

It seems to me that as the load factor is improved, the power factor becomes more important. And as the load factor is improved by the motor load, certainly the power factor becomes more important.

I feel that in our own case, at least, we are realizing more and more the importance of the high power factor and the loss that comes from the low power factor forced upon us.

I hope that any rate committee that may report, on any discussion of rates that may follow, will be in harmony with this paper and tell us something about the adjustment and correction of rates in connection with the power factors. Let us know what has been done in the way of penalizing for low power factor and how rates may be corrected and adjusted according to the power factor.

Mr. Wilson (Berlin, N. H.) I appreciate very much Mr. Elden's paper.

In my experience low power factor is in many cases due to the fact that the consumer does not know the amount of power required by different processes. I think it is the duty of the central stations to do all in their power to assist the customer in determining the proper size of motor; as the central station is to a certain extent a specialist in power, while the customer has his mind occupied with other problems connected with his business.

In the case of one large industrial plant, with a power factor of approximately sixty (60) percent, a rearrangement of their motors brought the power factor to seventy-eight (78) percent.

The manufacturing companies have put forth considerable effort in obtaining data as to the amount of power required in the different manufacturing processes. This information is available and I think the application would result in a great improvement in motor installation.

The hardest cases to handle are those in which the load fluctuates through a considerable range. These cases, however, can usually be taken care of by using a motor having a rating of approximately the average load, as motors of ordinary design will carry very large overloads for short periods. In extreme cases the flywheel as suggested by Mr. Mosman can be utilized to a good advantage.

In my opinion, the question of power is of like importance to the central station and customer as the extra expense of supplying a load at low power factor must eventually fall at least in part upon the customer.

The question of application of electric drive requires considerable care and study in each case. With conditions equal group driving usually gives better load and power factor. However, in many cases the individual drive possesses advantages which offset their disadvantages.

MR. OVIATT. I think every one will appreciate Mr. Elden's paper. I don't think he has given any more emphasis to the low power factor and its value or disadvantage to the company operating the system, or to the load factor, than should be given to them. But I do think there is one point absolutely omitted in this discussion, and that is the advantage of devising, in some manner, a rate which will apply to the low load factor and low power factor. Now, the benefits of keeping a simple charge system I don't think have been efficiently considered. That, in my opinion, is one of the important things to be considered before the proper corrections can be made for both load factor and power factor.

Mr. West. In Mr. Elden's paper the relation of the power engineer to the prospective customer has been referred to to some extent. A number of questions may be asked referring to the specific data of the installations that he has called attention to. I think, however, that the underlying principle involved, which is that when we help others we help ourselves, may be fostered by closer co-operation between power engineers. Our relation to the prospective customer requires a knowledge of a great many classes of business, together with a knowledge of specific operating conditions in each proposed installation, and I think that, while the Commercial Section of the National Association has done some good work towards an interchange of ideas, there exists an opportunity for closer co-operation between power engineers in the geographic sections.

President Sands. Mr. Elden in his paper has referred to the possibility of improving the load factor by finding a market for the charging of electric vehicles. I wonder if some electric vehicle or battery manufacturer in the room can tell us something of what has been accomplished along that line.

Mr. Day Baker. I think the increase in the demand for current for electric vehicles has been very rapid of late. I have no figures, because I did not anticipate that this subject would be brought up. But during the past year the increase of electric vehicles has been 70 per cent. in Massachusetts, and you all know that the electric vehicle can be put on at a very desirable point in regard to the peak load. Almost all electric vehicles are put on charge from 7.30 to 8 o'clock in the evening, and by the encouragement of the electric in your town you can readily see that your load factor can be materially improved. I am under the impression that Mr. E. S. Mansfield, who is here, has some figures and can give you information in regard to the load factor we are developing at the Atlantic Avenue Electric Garage in Boston, which will be of interest.

Mr. Mansfield. I haven't with me any exact figures in connection with this subject, but can simply say that in most of the charging stations established for commercial vehicles the maximum load comes on from 11 to 11.30 at night. The majority of vehicles are out on service during the afternoon and don't all get back until 7 or 8 or sometimes 9 o'clock. Then they have to go on the wash stand and be taken care of and then put on charge, so that the peak of the load does not come till still later, and it is almost always after the theatre period before all the batteries are being charged.

As for pleasure vehicles, some are charged in the daytime and some in the evening, but the majority of them will be off the peak load, although occasionally you will get some one coming in and putting his machine on about 4 or 5 o'clock. But that will be a small percentage.

In the larger garages the load factor, based on the demand during the time of the station peak, should be something like 70 or 80 per cent. I am not talking now from the book, because I do not remember the exact figures. But we plan on having on hand enough batteries which are being brought up or made up that are not going out on service next day to be on charge during the day time, and others only charging during the night, thus when one has been charged we put another one on the same charging plug and that gets charged before morning; so that we are practically charging during the 24 hours. Of course, it never would reach 100 per cent., but somewhere between 75 and 80 per cent. load factor should be possible in a properly organized garage.

President Sands. Mr. Oviatt raised a point which has a very pertinent bearing on the subject of this paper, and I wonder if any one here knows of any attempt that has been made to make a rate which differentiates between the customer having a poor power factor and the customer having a good power factor.

Mr. Burleigh. It may surprise you to learn that in connection with recent investigations extending over a period of several weeks, made in response to an inquiry received from one of our member companies, I have been unable to find a central station that is making a rate which offers any special inducements for the maintenance of a good power factor, or penalizes the customer for a poor power factor. This condition was certainly a surprise to me.

The conditions incident to load factor and power factor are among the most serious problems which confront the central station people today.

Those who have for some years been connected with the sale of current for power purposes realize the immense advantage of certain classes of power customers to the central station and the corresponding disadvantage of certain other classes.

The textile industry for instance will on the average present a power factor close to 80%.

Seven or eight years ago the average size of the textile mill motor was 100 horse-power. Today the average size is something less than 20 horse-power. This bears upon the question raised by one of the speakers regarding the individual drive.

The average power factor has not been impaired in proportion as the average size of the motor has been reduced, due to the fact that the manufacturers have made marked advances in the last few years in the power factor characteristics of the induction motor, and that without material impairment in efficiency.

The load-factor of the textile industry averages from 70 to 90% while that of the average machine shop is somewhere about 30% and many as low as 20%, and it is obviously unfair to consider the furnishing current for power to both of these industries on the same basis.

As the central station companies are fast becoming purveyors of power instead of light as was formerly the case, they will soon all, as many now are doing, operate their stations primarily for power purposes, furnishing light as a by-product; thus where they were obliged to obtain their return on the invested capital during the evening hours, they can obtain a much greater return during the working hours of the day. Under these conditions power-factor and load-factor and an equitable rate recognizing them has become a subject of vital importance not only to the consumer but to the distributor as well as to this Association, and is worthy of the most careful investigation and consideration of the National Electric Association as a whole.

I thank you gentlemen.

Mr. Holmes. With reference to the rate for better power factor, the Cambridge Electric Light Company, which I represent, has just lately given to one concern, and it would be given to others, a lower rate for improved power factor conditions. Our sliding scale rate now runs down to 1 3/4 cents per Kilowatt hour for consumption of about 90,000 kilowatt hours per month. This is the lowest rate we have ever given to anyone, but lately we have given to a large industrial concern the rate of one cent per kilowatt hour because of the fact that they will install a synchronous motor of about 300 H. P.; the conditions being that the customer will relieve the synchronous motor of load during three months in the winter, the synchronous motor running idle during that time, the remainder of the year they load the synchronous motor for their use.

Mr. Hayes. The last speaker has raised, I believe, a point which is of great interest in connection with the solicitation of power. The power solicitor is of necessity decidedly concerned with the heating problem. In factories as a rule the boiler capacity necessary for heating alone is a comparatively small proportion of that necessary for the entire power requirements. It is possible in some cases to suggest to the prospective customer the possibility of introducing a generator driven by an engine or turbine of a size suitable to take care of at least the lighting requirements during the winter months. It is possible also that this machine may be designed so that the generator can be operated as a synchronous machine during the balance of the year, for the purpose of meeting the power factor. This arrangement obviates any winter peak on account of this particular customer, and this feature together with the improved factor should prove very desirable from the standpoint of the central station and might well be taken on at rates favorable to the customer.

Mr. Mixer. The introduction of the question of rates in connection with power factor having brought out several remarks, I will say that I have a little bit of definite information along that line, but not as much as I want; therefore, I introduced the question hoping that I might get something more. Apparently, I have something to give and am pleased to give it now. I have had assistance recently from one of the committees of New England Section of this association, and while that assistance did not bring anything definite, yet it is good in this connection. Elsewhere I have learned that one large company in the Middle West is giving a discount of 10% if the power factor is above 90. I found a company in the South, and also one of the Canadian Transmission Companies, that is varying its rates according to power factor. They have fixed upon 90 as a standard and the actual rate is determined by dividing the rate at 90 by the actual power factor. Therefore, if the power factor is less than 90 the rate goes up, and if it is more than 90, the rate goes down. I have also learned of a company in the Middle States that has a scale of power factors allowed for different sized installations, varying from about 70 for ordinary sized motors up to 90 for large ones; and applying a similar correction; viz: dividing the rate at 90% by the actual power factor, thus increasing the rate if the power factor is low and decreasing it if it is high. I am pleased to add this particular information now but I hope something more can be brought to our attention on this matter. I made some inquiries yesterday on this question. I was told that in some states nothing could be done in this matter on account of the public service commissions not recognizing the importance of power factor. Possibly, if we will give the matter the investigation and attention it deserves the public service commissions may come to realize what it means, and where they now refuse permission for this adjustment of rates, may be ready to allow it.

Mr. E. H. Brown. There seems to be no one here from Willimantic or New London, or he would undoubtedly have spoken before this. Inasmuch as I am merely the representative of one of the manufacturing companies I bring this second hand. In New London Mr. Campbell explained his rates, as well as Mr. Lewis at Willimantic. They have a schedule which is really based on power factor considerations.

They make a base rate, so much per k. w. hour, and then on top of that they take the actual kilowatt consumption and the K. V. A. rating of the apparatus connected and divide the K. V. A. rating by the kilowatt consumption. Then they use that result as a factor upon which to base the discount from the base rate for the consumer. That gives a very considerable premium on good load factor and power factor combined. You will pardon me for bringing second hand information.

President Sands. I should like to ask if you could explain that part of their schedule which deals with non-peak service?

Mr. Brown. Their rate depends on the hours over which they are used and the maximum demand. They use some sort of maximum demand device in connection with their rate, but I can go no further than that, because I fear I might make some technical mistake.

President Sands. I think Mr. West can tell us something of a similar rate and possibly some efforts to adapt some standard for non-peak service.

Mr. West. The Salem power rate is a regular sliding scale for current with a discount for load factor as represented by the number of horse power hours used per horse power of demand. We divide the net horse power of demand (75 per cent of maximum as recorded) into the total number of kilowatt hours consumed and allow discounts from graduated table for the number of kilowatt hours used per horse power of demand.

President Sands. The matter of penalizing a customer with a power load factor may not seem such a serious problem to the man who is operating a straight A. C. station, but I think the point was raised in the discussion of Mr. Mosman's paper as to just how you would treat that matter in a station operating both D. C. and A. C. apparatus. The question is, how can you justify the penalizing of a man because he uses A. C. current, charging him a higher rate than he would pay for the same service if he were using D. C. power, when the Company elects for reasons of its own to serve him with A. C. I should like to hear from someone operating both A. C. and D. C. current as to what he thinks on this subject.

Mr. Mosman. There is a point about penalizing for power factor which puzzles me, and that is, how are you going to do it? How are you going to know in the case of a large installation what the power factor is? It is possible to get an idea of the power factor by installing curve drawing instruments for measuring volts, amperes and watts. Probably a curve drawing power factor indicator could be supplied if there were a sufficient demand. The installation would, however, be quite expensive, to install, maintain, and to apply its indications. I really think most of the trouble comes from the aggregate of small consumers rather than from the few large and important consumers. How can you afford to get at them? It calls for such an outfit of instruments as would increase the investment considerably. I also think that we are rather forgetting human nature somewhat in the discussion of these rates. The customers are sufficiently suspicious of present rates, and by tacking another feature, power factor, on to the rate you will convert the consumers into confirmed pessimists. There is another point: We have been talking about load factor, and there is a great variety of load factors. Mr. Elden means the ratio between average load and the maximum load. In one speaker's remarks—I think it was Mr. Brown's—the load factor made use of was a ratio between the average load and the K. W. of installed apparatus—two very different things. If you base the rate on the ratio of the average load,—that is to say, the K. W. hours per month and the K. W. hours, if the apparatus had been running continously at full load, you have from the central station point of view a beautiful solution, but one that burdens the consumer heavily. I think Mr. Mixer referred to a rate system in which the basic rate is divided by the power factor, whatever it happens to be, if less than 90%. In other words for 80% Power Factor you divide the ordinary rate by .8. This is not fair to the consumer as, although the capacity of electrical apparatus necessary to serve the consumer is increased in that proportion by the lower power factor, its cost is not, the prime movers are not sensibly increased in size or cost, and the coal consumption is not appreciably affected.

Mr. Fleet. I have listened with a great deal of interest to Mr. Elden's paper and also to the very able discussion of that paper. Just while I was sitting here I made a few little notes of the various things that our power solicitor has got to talk of with a prospective customer. Here is a list of them, and I believe before he can approach most of the busy men of the city with such a list of questions he would have to be dressed in armour plate. First of all we have got to tackle the rate regarding the number of K. W. hours. Next the rate per K. W. hour for off-peak demands. Next, the K. W. rate for the demand depending on the demand the customer will want. Next comes in his load factor to vary the rate. Then comes in power factor to vary the rate. Next comes the fluctuating load to vary the rate. The next rate depends on whether it is A. C. or D. C. power. And so it goes. Now I believe a good many of these difficulties could be readily overcome by not paying such an awful lot of attention to these very small details. Take a small customer, ten, twelve or fifteen H. P. You can't come in and ask that man to make a very great change in his system. But I believe that you could vary your power factor and increase your power factor by putting in synchronous motors in some of the large consumers' places and thereby improving your power factor to such an extent that it would not be necessary for the solicitor to get into an argument with a prospective customer. I think the solicitor already has a pretty difficult job on his hands to get power as it is today. It is a hard and trying position. Many a time the solicitor comes in to me with tears in his eyes. He has talked and talked trying to get power, trying to get a load. And if he gets a prospect to the point of succumbing and then comes at him with a list of questions like that to vary the rate, I think his chances are nix for a contract. While it is, of course, a serious proposition—the load factor and power factor on a central station—yet I do not think we ought to go down too far into details on this thing. I believe we ought to put in synchronous motors in the large stations, in the railway plant or the cotton mill, where in some cases they use 300 or 400 H. P. motors, and often larger than that. On some drives where they can't use individual drives, due to the tremendous amount of starting power it requires to start up individual machines, they have to use a large motor, though once the machines get into operation it takes a comparatively small amount of power to run them, but it takes a lot of power to start them. Now if we could get synchronous motors into those places, I believe we could make the power solicitor's life a little more agreeable to him.

Mr. Schwabe. I want to recite an opportunity which was taken advantage of and a synchronous motor installed in a small outfit. I want to bring this out to show that the synchronous motor proposition is good for small stations as well as large, and I think this example will forcibly bring it out. This station has a water wheel unit of 160 K. W. capacity. At times the load figured 120 K. W at 55% P. F., and then an engine unit was started to carry additional load. A factory had been solicited for power and a plan had been laid out that covered an installation of eight individual motors with a total capacity of about 62-H. P. The opportune time for us to push this power prospect came when repairs became necessary to the engine. A synchronous motor proposition was then made and we succeeded in closing the deal. The rate given was 10% less than the regular rate, and the obligation of the customer was to operate this motor throughout the year from quarter of seven to five minutes after six, running through the noon hour. We started this motor last Saturday with very satisfactory results. We have corrected the power factor from 55 to 90 and are now able to take all the load on the water wheel unit, not only the little additional load there was that exceeded the current capacity of the generator, but the 40 H. P. load this factory gives us as well. In this case the matter of who should pay for the installation came up, whether we should stand a portion of it or not. So in order to close the deal, and in order to have the control of the apparatus, we made a proposition to install this outfit at our own expense. The contract for the original outfit that was laid out for this factory of eight motors had been dragging along for several years and never would have been closed. But the fact that we let the manufacturer out of any cost of installation appealed to him very strongly, and after some talk on the subject the deal went through. In addition to correcting the power factor, it has done wonders in improving the service.

Mr. Knowlton. May I ask Mr. Schwabe how large the motor was?

Mr. Schwabe. A 125 K. V. A. synchronous motor.

President Sands. I think the old saying that the evil men do lives after them applies very aptly in this case. The time is not very far distant in the past when this term "power factor" did not appeal to us. We did not think it meant much. There was but one thing by which we graded the rates which the customer should receive, and that was the size of the motor to be installed. And the larger the motor the lower the rate he got. Today we are suffering from what we did then and the future depends on how well we learn the lessons of the past. I am going to ask Mr. Elden to answer these questions. In your paper, Mr. Elden, you spoke of the installation of trial motors. I would like to ask if, in your opinion, that expense is warranted in the case of fairly large sized installations.

Mr. Elden. In the preparation of this paper I have tried to deal fairly with everybody, but I notice that the printer has been unfairly referred to as to his part in the preparation and delivery of the paper to you. The delay in your receipt of this paper was not due to the printer but was entirely due to my failure to prepare it in sufficient time for him to print the paper for your earlier use.

I have spoken very frankly on this subject on several occasions, because I feel very strongly on the whole matter, particularly that of power factor. There have been so many illustrations of what could have been avoided in unsatisfactory installations that I feel that I may speak with reasonable surety as to the ground I am taking on this subject.

The part which the manufacturers play in this matter has been referred to, and in making such reference it has been without prejudice. One recent occurrence illustrates the part which the manufacturers play in dealing with this matter with reference to the interests of the central station. A certain factory not many miles from Boston was proposing to electrify its equipment, the apparatus in question was adapted to individual drive, the entire equipment requiring something like 40 motors. The manufacturers of the individual pieces of apparatus advised that motors of 5 H. P., 3 H.

P. and 2 H. P. each were required to drive this machinery. One manufacturer, upon being requested to submit a proposal for the necessary number of motors of each capacity, suggested that it would be desirable to purchase all of the motors of 5 H. P. capacity, for the reason that the motors would then be uniform and of one size throughout the entire equipment. This is one of the unsatisfactory suggestions which eminate at times from manufacturers agents in their endeavor to increase the total motor sales to their consumers, and in this particular case would have resulted in extremely undesirable conditions, due to not only poor load factor, but poorer power factor conditions, inasmuch as many of the motors would have been installed much too large for the work which they were to perform.

In reply to questions relative to the merits of individual and group drives, Mr. Burleigh has brought out one case where the individual drive undoubtedly gave satisfactory results. I have in mind one customer on our own lines who uses a large number of small motors, averaging two horse power each, with a resulting power factor as high as 65%, which is very unusual for such an installation. In some of the larger installations referred to, group drive resulted in power factor between 80% and 85%, where individual drives in the same case would have resulted in power factor as low as 50%.

These statements are the result of experiments with existing installations as shown by the results of actual trials with trial motor installations, which were made with the object of ascertaining exactly the right size of motors for use in final installations. It is very desirable to teach all A. C. motor users to take advantage of the overload capacity of such machines as far as possible. That this is done in some cases may be noted by reference to installations in large mills where motors are regularly run at 100% overload. These motors are of early types of manufacture and undoubtedly have larger overload capacities than motors regularly furnished by the manufacturers today.

Mr. Burleigh has referred to the effect of load factor on rates, and it might be noted that this matter really automatically adjusts itself from the fact that the higher your load factor the lower your rate grows automatically, which condition tends to the satisfaction of the customer. It has been frequently suggested that an additional charge for current should be made in installations developing low power factor. Mr. Mosman has suggested that recording instruments to enable a proper determination of charges for low power factor are exceedingly expensive and delicate to handle, and this may be said to be one of the serious obstacles to be overcome in arranging a suitable charge for low power factor, and, at the same time, be fair to the customer. This charge for low power factor involves the use of recording instruments for each hour out of the twenty-four, and the method of charging should necessarily take into consideration the conditions developed throughout the entire day if the customer is to be given fair consideration.

One prominent authority on the rate question has suggested that it would be possible to arrange to purchase leading current from power consumers under conditions which would be favorable to the central station companies, but whether this is the proper solution or not, I am not prepared to say.

One speaker suggested that power solicitors have a great deal of trouble in dealing with prospective consumers and apparently he had some friends in the audience. If I remember rightly he read off a formidable list of subjects which the power solicitor has to deal with in talking with prospective consumers. Without disputing his particular experience it would appear that the power solicitor does not deal with any of the subjects referred to. Ordinarily, the first matter to be decided by the solicitor is the prospective load the consumer will develop, after which it is only a question of figures to apply such use of current to standard rates, this making it unnecessary to approach the customer on any other subject except final charges for current. Should, however, a power solicitor be obliged to discuss power factor with the consumer he will undoubtedly be somewhat embarrassed as the explanation of power factor is difficult to make a customer understand.

Our President has asked regarding the expense involved by using trial motors and I may add that such use as has been made of them in our district has more than justified the expense. This expense has not been borne by the Company in all cases as some customers have realized the situation as bearing on their own investment, and in at least two cases have voluntarily purchased a number of motors of standard sizes and have used these in determining the proper motors to install in the final installation. This practice cannot always be carried out as the expense would in some cases undoubtedly be prohibitive. One large manufacturing company in our own district is prepared to experiment with prospective customers, furnishing trial motors for such purposes upon the assumption that in the end they will at least be favored with the final order for motors. In our own company it is now a practice to test all A. C. motor installation with a view of determining whether the customer's apparatus is going to develop satisfactory operating conditions on our system, and while up to date we have not been obliged to refuse any installation, it is easily conceivable that conditions may appear in the future where we would refuse to supply power at regular rates to ascertain consumers whose equipment does not comply with our requirements as regards power factor conditions.

MORNING SESSION, MARCH 22ND.

President Sands. The Convention will listen to a paper by Mr. C. R. Hayes on

"THE RELATION OF THE CENTRAL STATION TO THE WIRING CONTRACTOR."

By C. R. Hayes.

Manager, Fitchburg Gas and Electric Co., Fitchburg, Mass.

The subject which we have before us is not a new one. It has been discussed and pondered over by every Central Station manager and every contractor doing business within the territory served by a Central Station.

The conditions obtaining locally in the various cities, doubtless, have much to do with the solution of the problem. That a problem exists, will undoubtedly be generally admitted. Much light might be thrown on the subject by giving a review of the growth and progress of the Central Station industry and a discussion of the part which the contractor has played throughout this period. A careful analysis of the events of the past history of the industry might lead to some definite conclusion of why present day conditions exist. Personally, I much prefer not to go into the past but to look conditions as they exist today squarely in the face.

First, let us ask, "What is the function of the Central Station in the community?" The immediate answer must be, "To manufacture and supply electricity for light, heat and power on reasonable terms."

The contractor immediately says—"Right! And if then the Central Station will perform its function, we will do the rest,"—and lo! what happens? Well, I believe that the general experience has been that if the Central Station is content to take on only the business that comes to it, it can grow but slowly, and can ill afford to reduce its rates even when forced to do so by the public clamor.

This is not as it should be. The Central Station must take the initiative. It must be zealous to take on new business, extending its lines wherever prospects for business are good, and its activities must be as great as though actuated by the keenest of competition in its own line. In doing this the central station cannot expect the contractor's full support unless there is a pretty clear understanding between them of the policy of the company and the lines along which they both shall work.

It is necessary, therefore, that the contractor and the Central Station shall get together. The Central Station must outline fully and completely its policy, and it must, I believe, concede to the contractor the right to do all construction work other than that in connection with the Company's own lines and apparatus.

Co-operation to the last degree is absolutely essential to the complete success of any plan involving action on the part of several. Therefore, the contractor cannot go out and solicit business successfully unless the policy of the Central Station is such as to insure a positive demand for that which the contractor has to offer. Similarly, the Central Station cannot undertake to create a large demand for wiring by means of advertising and solicitation unless assured of the support of the contractor.

An investigation of conditions in different cities brings to light the fact that various methods are being used to bring about very excellent results. We find that in some cases the contractors are working so closely in harmony with the Central Station that you are led to believe that they are in reality on its pay-roll. In other cities, the Central Station may have operated a wiring construction department for years and what few contractors that do exist are making more money installing an isolated plant here and there than they are otherwise.

Intermediate between these conditions we find a city where the Central Station has been conducting a wiring department as a part of a campaign to increase business along certain lines, but has just given it up perhaps and is working out a scheme along co-operatives lines to the mutual advantage of both the Central Station and the contractor.

The question, therefore, before us both is this, "Is it necessary to go into the wiring business to properly push any new business campaign?" One says, "No!" another, "Yes, absolutely necessary!" and still another, "Well, we'll go into it, and stay until the contractor does as we want him to do and then we'll quit, but we will lose money doing it."

How about the contractor? In the first case he is busy and is having all he can do to attend to the work which the Central Station solicitor is pushing his way. He is, however, ready to expand his organization to meet any new requirements, and in this way builds up a volume of business proportionate to the prosperity of the Central Station.

In the second case where we find the Central Station positively opposed to the contractor we are inclined to desire to investigate personalities, either on the part of the contractor or of the representatives of the Central Station. We say this inasmuch as we are of the opinion that if the subject is frankly discussed and analyzed it is practically impossible not to obtain a solution satisfactory to both parties, unless it be that the personal equation is eskew somewhere.

The third condition may be brought about, and I believe usually is, because the contractor is skeptical of the real intention of the Central Station in urging lower prices for certain classes of construction work. The contractor may fail to appreciate that certain classes of work can be done at a very close margin and at the same time without increase to his overhead expense and we believe without prejudice to the prices obtainable for other classes of work.

To properly cover the subject assigned to us it would seem that we must attempt at least to accurately point out just what should be the relation of the contractor to the Central Station, admitting that today the conditions existing do vary, and vary widely in the different cities and towns.

It is a fact that there is every reason to expect to find electrical wiring contractors where there is no Central Station activity, though the amount of work handled is small and the prices charged necessarily large. Then again, I believe we may say that the Central Station may also exist and thrive without a single contractor in town. Construction work will necessarily be done by the Central Station so long as there is no one else to do it. We cannot conceive, however, of there being a city or town served by a really aggressive Central Station where the need for a wiring contractor has not resulted in there being one, and more often several.

Both, therefore, can exist without the other with a greater or less degree of success. We believe, however, that the Central Station should not be in the wiring business. This, for the very simple reason that better results can be obtained if the contractor is allowed to act as an intermediary in the process of connecting customers to the lines of the Central Station.

The contractor must recognize that his business, and also his profit, will be larger if the Central Station is aggressive and successful, and he should in order to obtain the greatest profit endeavor to co-operate along the lines proposed by the Central Station to the end that nothing shall stand in the way of a full appreciation on the part of the public of the important part which the Central Station plays in the life of the community and in addition a more widespread participation in the advantages offered. The Central Station must, I believe, recognize that inasmuch as the desire to obtain electric service precedes the necessity for electric wiring it should bear the expense of practically all solicitation for new business. The demand for wiring created by the activities of the Central Station should be the means of a substantial business and a profit to the contractor.

The opportunity to obtain a large share of his business without spending a cent to create the demand should interest the contractor decidedly. That the Central Station should insist that popular prices be charged for work thus turned over to the contractor is not to be wondered at. The failure on the part of the contractor to appreciate the justice of this often leads to the necessity of the Central Station conducting a so-called cut price, wiring campaign until a sufficient volume of business of a certain class is coming in to make it self-advertising.

The Central Station would assist the contractor to maintain a high standard of quality in all work attempted. If the contractor will take on work, not at a loss but at a small margin of profit, the larger field opened up will in itself offer greater opportunities for profit which would not otherwise be obtainable. Each customer serves to bring another, and as soon as the ball is rolling the expense of obtaining new business is greatly lessened.

What should be the policy of the Central Station regarding the sale of appliances including motors? The display and sale of electric appliances certainly constitutes a legitimate and necessary method of creating a demand for the Central Station output.

The success of the Central Station is largely dependent upon the number of current consuming devices upon its lines. The interest of the contractor in the sale of electrical appliances must naturally center in the profit which he can make on a sale. While the profit on the sale of an appliance is of only secondary importance to the Central Station, we do believe that prices should be maintained so that the contractor at least will be able to make a fair profit and assist the Central Station by endeavoring to make all sales possible. We say therefore, that the Central Station should urge the sale of electrical appliances, but at the same time make the sales at prices which will gain the support of the contractor.

Regarding the sale of motors, again I say, the profit is not of very much importance. Not enough, at least, to warrant the Central Station advocating the purchase of one make of motor to exclusion of all others. The Central Station is interested to see that its customers have motors of good design and of a type suitable for their requirements. In the matter of motor sales, then, the Central Station may well concede much to the contractor.

In the flat-iron campaign, I am inclined to the opinion that too low a price prejudices the customer into the belief that if the use of irons is so greatly desired by the Company, it is pretty sure evidence that they can hardly afford to use it. The merits of the electric flat-iron are sufficiently great to make it comparatively easy to sell them at a fair price, and one which will lead the contractor to push its sale as well.

There is one appliance which primarily concerns the Central Station, and that is the incandescent lamp. The practice of giving free renewals of carbon and Gem filament lamps is essential to good electric lighting service. Even with this practice in vogue, a few lamps are doubtless sold by the contractor to customers of the Central Station. The local contractor does, however, find a fairly large outlet for incandescent lamps to mills and shops which are not served by the Central Station. It is to these same customers that the contractor looks to sell the more costly tungsten lamps, and at a good margin of profit if he is protected by the Central Station.

Tungsten lamps have been and perhaps always will be sold by the Central Station at prices which are near, or even less, than cost. Contrary to early expectations, the introduction of the tungsten lamp has not decreased the earnings of the Central Station. It has popularized electric lighting to such an extent that the Central Station has endeavored to place them well within the reach of all by means of price reductions. These price reductions have, perhaps, meant much to the contractor in cases where the Central Station does not refuse absolutely to supply the mills and factories. Frequently, the contractor may feel that he can even up by getting out and hustling to sell to the Central Station customers the 15-watt tungsten, which, as a rule the Central Station refrains from carrying, and perhaps also by taking orders for the 10 watt 8 candle power lamps, which we understand will soon be on the market.

The remedy of course, is for the Central Station to take the stand that it will sell tungsten lamps only to its regular lighting customers and in addition offer to its customers both the 15 watt and the 10 watt lamps if a reasonably long life is now obtainable. It is our opinion that little will be gained in the long run by holding back the introduction of the lower candle power tungstens. Electric lighting to be popular must be cheap and it will then be used more generally, with a greater net profit to the Company. From the standpoint of the customer, the use of the tungsten lamp in reality means a reduction in rate.

Thus it must be evident that the relation of the Central Station to the wiring contractor, is such that neither can afford to ignore the other. The more nearly the two work in harmony, the better will it be for both.

The spirit of co-operation which is so essential to success can be brought about in many ways. Certain Central Station managers are at stated times meeting all the local contractors together, seeking to give all the same opportunity of a free exchange of ideas. In a number of cities, organizations or clubs are formed where the electric company employees and the contractors and their employees meet on a common ground for a common good.

The National Electric Light Association is now urging the contractors and their employees to become Class E members, thus to become more closely affiliated with the employees of the Central Station and to bring together in one big organization every man who can be of assistance in making the electrical industry the most important industry in the country today. "Our hat is in the ring" and the latch string is out and now it is up to the contractor to mix in.

President Sands. This paper, Gentlemen, is a very interesting one and I know we will want to discuss it very liberally. But unfortunately our time is very limited and I am going to ask all who participate in the discussion to be as prompt as they possibly can. The paper is now before you.

Mr. Addis. The subject of the paper which has just been presented, we certainly will admit is one of vital importance to every central station man. Interior wiring is a theme among the central station men which has long been a problem. The terms "interior wiring" and "new business" are synonymous, one depending absolutely on the other. I am speaking, now, gentlemen, from the standpoint of the small central station manager serving a community of less than 15,000 inhabitants. And it may be taken for granted that my remarks will not necessarily apply, or perhaps be interesting, to the central station manager of cities of from 50,000 to 150,000 inhabitants. So I shall have to confine my remarks largely to my experience. About one year ago our company had contracted for part of its supply from the large New England Hydro Electric Company, the Connecticut River Power Co., thereby enabling us to reduce our rate to our consumers one-third. We had increased our power plant capacity 100%, installing apparatus strictly up to date, of the latest improved type. Matters went on for one year. We were barely holding our own in the way of new business, possibly getting a few above what we were losing through disconnections for one reason or another, which you all know. What was the matter? We had anticipated an avalanche of business, but failed to get it. Why? Something certainly must be wrong. Our prices were right, our service was certainly to be compared with any in New England. Something was wrong. Up to this point, gentlemen, our company had absolutely refused to enter into the new wiring game in any way, shape, manner or form. We kept one wireman, who was used in the capacity of meter indexer and trouble man on interior wiring installations. The manager sat down to his desk perplexed. The years business had not been satisfactory. Optimism had begun to fade. The people did not want electric light under any consideration. If people would not use electricity after our rates had been reduced one-third and in connection with the new Tungsten Lamp which would certainly reduce them 50% more.

We had about made up our minds that electric light was not popular.

We have two contractors in our little town. The relations between the company and the contractor were friendly, very friendly. We were handing the business right out to them, gentlemen, just as fast as it came to us on a silver platter. We could not get them there quickly enough, we were so hungry for new business. Something was wrong. *We could not get the business.* Searching through the office records and back numbers of all the electrical publications I could get hold of, I read up on the subject of New Business—how to get it. Nothing doing, gentlemen. They all said, "You must not antagonize the contractor under any circumstances. You must not enter into the new-wiring game." That was a difficult situation. The National Electric Light Association had not issued a handbook as to the proper angle at which we should cock our hats as we passed a contractor on the street. We had no information there. So, gentlemen, with much fear and trembling we decided to produce a knocker in the shape of the contractor, and if necessary to enter the arena of the wiring game ourselves in self-protection. We had firmly come to the conclusion that the prices of our local contractors were so high that the prospective consumer could not afford to wire his residence. We immediately took the contractors into our confidence, three months before we launched our low-price wiring campaign, giving them every opportunity to forestall our plan, and also that they might go out simultaneously with us with a low-price wiring campaign should they see fit to do so. We did not receive any indication that such was their desire. In fact, the leading contractor in town said right off the wire: "Why, that won't interfere with my business anyway. Your proposition won't touch the business I am used to catering to. It is the big fellow I am after, and you will hit the small house owner." That was just what we wanted. We issued a series of advertisements in the local papers, taking a seven-room dwelling as the basis of our figuring, and presented to our locality the opportunity of having a seven-room house wired and equipped complete, ready to place the lamps in and turn on the switch, beginning at $20. The next step was $25 and our masterpiece, gentlemen, was a $30 proposition. What was the result? The result was that everything around our office began to assume a rosy hue. Orders came in thick and fast. Understand, Gentlemen, we had not a solicitor in the town, did not maintain a new business department. The manager in these small towns, you know, is everything. I was the new business manager for the time being. Business came in thick and fast. We told the boys in our employ, "Every man who brings in an order for a $30 proposition gets $1.50 commission if he will just put it up to the electrical superintendent. Every man who gets a $25 job will receive $1.25 premium. A $20 job pays $1. premium." We paid $21 in premiums to the foreman of our line gang. That was going some.

The organization was thoroughly awake to the situation. We had something good to offer the people. The whole community seemed to be enthused. It really seemed as though we were on good speaking terms with the whole community. Did they appreciate it? The community certainly did appreciate it and responded nobly. I had in 1911 added one hundred and forty new residences on our mains without spending $100 in the way of extensions, new transformer apparatus and other work of that description. And my advice, gentlemen, speaking from the standpoint of a small electrical manager, is that if he finds he cannot get business in his territory, is not getting business in his territory, there is something wrong. If he has a contractor in his territory, the chances are nine out of ten that the contractor's prices are too high, and my advice is to go into the wiring game and get the business that is waiting to fall into your hands.

Mr. Rowell. Some nine months ago I was brought into touch with a community about the size of one that the gentlemen has just spoken about, something less than 15,000 people. The community had been fairly well worked and it was fairly up to its point of saturation for business we could get. But we were not quite satisfied with that. It was a new proposition to us and we wanted to get every particle of business there was in the territory. So we started in on this basis. We said to our local manager, "First we will furnish you a solicitor, a good one, the best we can find. We will also put in your hands an amount of money which will allow you to get business and charge it to this account. If a man says to you he can't afford to wire his house, we will wire his house an allow him to pay for it on the installment plan and we will pay the contractor." So that we put into the man's hands everything he could have so that when he went to a prospective customer there was absolutely nothing that would stump him. In this particular instance we furnished the manager with $1,000 which he had to draw on at any time. When we went to the community there was one contractor. At present time there are seven contractors working, all of them very busy. We have been in the territory nine months and there has been $32. drawn from the $1,000. we gave the manager. Our power load has grown in nine months 200%. Our lighting load has grown 50%. Now, gentlemen, in my opinion—it is only an opinion— that is what co-operation will do with the local contractor. What we did with the local contractor was this. We drew up a proposition for wiring a house—a six room house, I think it was—and furnished that with its fixtures for $32. We first of all got the contractors to agree that they would do that amount of work—furnish those fixtures for that amount of money. They agreed to do it. We then cut a number of solicitors loose and the result is they have drawn $32. out of the $1,000 the manager had to use in any way he saw fit. If he found a customer didn't have more than $10. towards this thing, he would pay the contractor the rest of it and take his pay on the instalment plan. The result is in this community there has been spent $32. of a $1,000. In another community we gave the manager $2,000 and he has been working on this some three years and has spent $600 so far. His business has grown to a larger percentage than that I have just spoken of. That is one result of co-operation with the contractor.

Mr. Ball. We have done away with our own wiring department and are endeavoring to co-operate with the local contractors in every way possible. I think I agree with the writer of the paper that co-operation with the contractors can be had to excellent advantage to both the central station and the contractor. There are, however, a good many points which make it hard in this matter of co-operation. I think if you only had two or three contractors in your town who were modern business men, had good equipment and good methods of doing business, it would be very easy to co-operate. But you often find that you will not only have those three or four larger contractors, but you will be up against the proposition of a great many smaller contractors, contractors possibly having only themselves working and taking on business simply on the day's work basis. I think we all agree that in order to get business it is almost necessary that you specialize on some proposition. For instance, the gentleman who preceded me spoke of a special house-wiring campaign. That is very good and I think that is the way we have got to go after it to get business. But how are you going to get up a special proposition and divide what business you can get amongst six or seven contractors and have them all satisfied? You find you have sent a certain price of business to one man. It is an old house. He is doing it on a certain fixed basis. One man would say you send him all the hard jobs and give the other man all the easy jobs. It is a pretty difficult thing to make your arrangements with so many contractors. If you do it with one or two, then you are not treating the others fairly. One other point, I think of is this—I don't know that there is any method of doing it—the standardization of materials that these contractors use. That is to say, materials, reflectors and things of that kind. One contractor in taking a job may figure on some very inferior, cheaper type of reflector for a certain lighting job. The customer is not versed at all in lighting methods, and he says, "Why, so and so will do this job $5 cheaper than the other man." The result is he is going to put in the installation with the inferior type of reflector and he is not satisfied. This certainly is not good business for the central station, because the customer is not satisfied. If some method could be reached whereby a certain standard line of reflector could be hit upon so that all contractors would use the same one of that line, it seems to me it would be of great benefit, because undoubtedly there is a good deal of trouble in the failure of the contractors to standardize on prices and materials.

MR. DEAN. I should like to have some of our fellow members state the methods adopted by them in their relations with the contractors. I would particularly like to hear how central stations regulate this business—that is, how the reputable contractors are sorted from the others, with consequent protection to the company's customers; whether there is a form of recommendation used, which includes the names of all reliable contractors, and do the contractors have an organization of their own? It seems to me, if we can get some idea of how other companies are successfully handling this matter it would help us.

MR. TOWNSEND. Mr. Hayes' paper is so thoroughly in accord with my own ideas on the subject, that I have nothing to add.

Several years ago I was with the Lowell Electric Light Corporation, at Lowell, Mass., as Superintendent of Distribution. The Lowell Company at that time did not do any contracting. There were four reliable contractors in the City. The company furnished the customer all of the wiring in connection with arc lighting free, and this work we turned over to the contractors, dividing it as evenly as possible between them. We were not able to work this division out on any percentage basis. We had, however, very little friction as the contractors felt that we were trying to be as fair as possible. Our solicitors also when securing prospects tried to distribute the work between the contractors as evenly as possible, where prospects did not show any preference.

I do not believe, save in exceptional cases, that there is any excuse or reason why a central station should do house wiring. I have operated companies in cities of 15,000 and over, and we have always been able to have the contractors co-operate with us, and where there were no reliable contractors, to induce some reliable contractor to enter the field.

Two years ago I went to Woonsocket, R. I., a city of about 38,000 population, and the company at that time was doing house wiring, and a general jobbing business.

Very soon I made up my mind that the company was operating this department at a loss, and instead of making friends were making enemies, which could be traced clearly to some jobbing controversy. Due to the company doing practically all of the jobbing in the city, there were only one or two small contractors in existence. They had but very little capital, and were not able to swing the business if we were to turn it over to them. We finally got parties interested who could furnish the necessary capital, and sold out our stock at cost, and discontinued the jobbing business. Since that time our relations have been much more pleasant with the public, (and here is a point we often overlook), and our relations have been most pleasant with the contractors. We have found it a great relief to let the contractors take that part of the burden. The contractor is also in a much better position to demand the collection of his bills than the company who is furnishing the customer with current.

We sell appliances and believe that the central station should sell appliances. Our prices, however, are practically list, unless we are running some special sale. By quoting list prices, it enables the contractor to sell appliances at a living profit. We stock motors, and give contractors a commission on all motors that they can sell, whenever they wish to secure the motors from us. If they have motors of their own, they, of course, make the profit on the sale.

We have found that the contractors are willing, in case of any special campaign we wish to inaugurate, to quote us figures that will allow only a small margin of profit.

I believe that it is a mistaken idea for any central station to go in or stay in the house wiring end of the business.

Mr. Davenport. I have only a few words to say. The Narragansett Company of Providence has brought to this convention as its guest a live electrical contractor, the president of the Providence Contractors' Association. It seems to me, in view of the fact that I think all of the previous speakers have been central station men, that perhaps the contractors and the central station men who happen to be here will be glad to hear from an electrical contractor as to his standpoint of this question. I should like to call upon our guest, Mr. Lendrim.

Mr. Lendrim. This call upon me to speak comes somewhat in the nature of a surprise, as when I came down here as the guest of Mr. Davenport I thought it was more or less of a junket, and up to this time it has been. However, I have been very much interested in listening to the several gentlemen who have preceded me, speaking from the standpoint of the central station man.

Perhaps it would be well for me as a contractor to state in a somewhat brief manner the conditions as they exist in Providence. I have been in the contracting business in Providence, both as an employee and an employer, for a period of about twelve years, and I can say as a result of that experience that the relations of the contractors to the central station in that city are cordial in the extreme.

There the central station employes a very large corps of well-trained solicitors to solicit business for light, heat and power, and the majority of the large contractors employ either one or more solicitors for the same purpose. And their relations are also very cordial.

If we have a proposition for power which presents any real difficulties, we have the privilege of calling on the engineering department of the Narragansett Electric Lighting Company and they very kindly render us all the service from their corps of engineers that we may desire. And so we work together and give the customer the very best service at the least possible cost, and the result is satisfactory all around. We get away with a profit and the customer is satisfied.

We have there, also, the Electric Club, which has just been organized—it has not been in existence more than two months —and of which I happen to be president. The club takes in everybody identified with the electrical interests, whether wire men or fixture men or motor repairers—involves everybody in the allied trades. We have a little luncheon at one of the hotels there at 12.30 every Tuesday, and it is the privilege of everybody there who has a grievance of any kind or wants information to get up and state his grievance and ask for the information, and we have a general discussion on the subject.

Now, as to the methods of the contractor in securing business and the methods followed by the contractor when he gets a prospect, we think our system is perhaps as near perfect as can be arrived at.

The contractor, when he has a prospect, makes out an application on a regular printed form which goes to the company, asking them to furnish him with a service location, where they will carry the lines to the building, where they will place a meter, whether alternating or direct current, whether single-phase or three-phase, 500 volts or 5500 volts, etc., and immediately upon receipt of that information we proceed with the job. Immediately after we get it done we file two plans, one with the insurance association, the other with the local lighting company, stating the amount of work done. Then we have an inspection made by the local insurance department, and if all the work is satisfactory the contract goes to the lighting company and is connected up.

One of the gentlemen preceding me said they had three propositions to offer to prospective customers—a $20 proposition, a $25 proposition for wiring a cottage, and a $30 proposition. I am, perhaps, fairly well qualified to speak as to the relative cost of wiring, because—well, I ought not to say this—my experience has covered a period of about 25 years, and I didn't begin when I was in the cradle. I cannot conceive of any contractor or any central station man going into a cottage house and wiring it ready to put in the lamps and getting away with a profit at $20 or $25. There is something wrong somewhere. Either they steal the material, as it looks to me, or they are robbing somebody of a first-class living.

My pay roll in the last year—and I am only a small contractor—has averaged about $400 a week. The average wage we pay to our journeymen is $3.50 a day. Our helpers receive $2.19 a day. We have several men on our pay roll who are receiving $4.00 a day. And understand, gentlemen, these men are practically salaried men, our best men, because whether or not we have work to keep them busy all the time we have to maintain them on the pay roll in case of emergency.

Now, if you can pay a man $3.50 a day and furnish him a helper at $2.19 a day and do good work and furnish good material and wire a cottage for $20. I want you to show me how. I am from Missouri right there.

I maintain, gentlemen, that this is a local condition, absolutely local. It is a good deal like the tariff—it will never be settled. If you have a small country town with a small plant and want to increase your lighting load, and you can hire so-called electricians for $1.50 a day and you can get your wires in without a regular inspection bureau to inspect your work and a regular code of rules to work by, that is one thing. If you have to do the work according to the code and have a very strict interpretation of that code—if you have to do your work according to the inspection bureau, why your $20. is spent before you start your job. There is no question about that at all.

Another thing. I cannot conceive of any electric lighting company in any city of any size going into the contracting business and being successful. The principal reason for that is the labor market. Up to three years ago I tried to maintain what is called an open shop. And we fought the labor unions and we fought their allied interests. And every year showed that the fight was a losing proposition. We were forced to sign up with the local labor union and furnish nothing but union labor. Now, can you imagine a public service corporation going out and doing a general contracting business and not having union labor? They would not get as far as the basement before every other mechanic on the job laid down and quit. And right away you have antagonism.

Now, I claim it is a local condition and has to be treated as such. There is no question at all that the small village and the small town will have to do more or less construction work, but it must be treated locally. This thing, however, will probably never be settled right, exactly right. But give the contractor a show. I maintain he is the very best solicitor without a salary that there is on your pay roll, and will compare very favorably with your high salaried men.

We have two men in our employ who practically do nothing but solicit work, and they are not on the pay roll of the Narragansett Electric Lighting Company. I have to foot the bills.

Now, as regards this very popular word now-a-days, "co-operation." That is a good thing from every point of view. The Narragansett Electric Lighting Company is in a community that is probably as well served with light and heat and power as any community in the United States. They do not do any construction work whatever. Their employees do not enter the building except to set the meter. And I believe that a comparison of the growth of that company and any other company will show that the Narragansett company is enjoying a very healthy growth from one year to another. And I am sure they would not get any more business and would not be any better served if they employed a corps of wire men to do their work, and I think that is the policy of the company.

They sell heating apparatus and sell motors and maintain a very large stock of motors in their rooms, and that is a thing that is of great advantage to any contractor. I can go to a customer tomorrow and sell him a 50 horse power in motors 12 units. He says, "When can you deliver them?" I say, "Tomorrow, because I have them in my stock room." But they are in the Narragansett stock room all the time. And everybody who sells a motor knows the difference between the retail price and the price to the contractor or the central station man is very small, indeed. Probably, after paying freight and cartage you have a net profit of only 10 per cent. And I think it is only just to the dealer outside of the central station that they maintain prices, and that is the policy of the Narragansett company. They maintain the retail price on everything, and everything they sell to the consumer they sell to the contractor at a lower price than the ultimate consumer can buy it.

The matter of Tungsten lamps is another proposition. They have a very low resale price on Tungstens, and make contracts with contractors and consumers so that in selling in packages, other than broken lots, there is a great saving. I thank you.

Mr. F. D. Adams. I want to say to my friend the contractor that I am right in his boat. In New Haven we are with the contractor from the start, our motto is "Live and let Live." Of all the $35. jobs there are I never saw one we would allow on our line. We have 14 contractors in New Haven, employing from 40 to 45 men, they are all on our pay roll without pay, they can have anything in our place, just the same as in the case of the Narragansett Company. If you follow up these $25. $30. and $35. jobs you will find that they are humbugs, you cannot work them in the larger cities, there is nothing in it. I have been to cities and asked the managers to show me some of these installations and they could not show me one. We are maintaining a wiring gang of 14 to 15 men to take care of repairs and some commercial installations, but the majority of the commercial wiring and all the house wiring is handed out on a silver platter to the contractor. The contractors are with us from the start to the finish.

We are starting a campaign now which will take about 90 days to run off. We thought it would be necessary to have an automobile, and one of our contractors said he would furnish the auto, and has bought the same, and is ready to co-operate with us in this compaign. I should have liked to have had one of our contractors represented at the convention to tell you just what treatment the contractor gets in our city.

Mr. Rowell. Just one word in regard to this special offer of $32.50 for wiring a six or seven room house. It never took. It was simply an offer that brought the proposition before the people and gave the solicitor a chance to get just a little under the skin of the prospective customer. I think I am safe in saying that we haven't three of those contracts in force.

Mr. Addis. That gentlemen from Providence who spoke must have been an unhappy consumer some time in his life. We electric station men are always accused of being robbers and thieves. We never tell the truth when we read a man's meter. As to the tin foil on our fixtures, I should like to have the gentlemen from New Haven try to wrap up his tobacco with the tin foil of our fixtures. You are both speaking from a different standpoint from which I spoke. I believe I made it understood in the first part of my remarks, that I was speaking from the standpoint of the small community. The comparison is nil. There is no comparison between the community of 7500 or 10,000 inhabitants and a city like New Haven. I am familiar with New Haven. My mother and father live there today. Now what I wish to impress on the small station man is this. He depends upon new business for his prosperity. The contractor doesn't bring it, in the small towns. As for getting away with a proposition of $20, for wiring a seven-room cottage, if the man from Missouri wishes to be shown I will welcome him to Brattleboro and we will show him some of the slickest pieces of wiring there at $20, $25, and $30 he ever set his eyes on. Now don't misunderstand me, it is not all the ordinary knob and tube work. Now then, as to the profits. Understand right from the start, we did not go into the wiring game for the profits to be derived from the wiring. We want our profit from the sale of current, the same as any central station man is looking for. We have, however, on the wiring business secured in 1911 made 10% in the bulk on all of our wiring propositions. Now as to the gentleman who says his $32. proposition did not go—could not make it go—I want to tell you right now that I received advices from our electrical superintendent yesterday that he has closed up at least $500 worth of work this week so far on the $30 proposition. So you see, gentleman, it does go in Brattleboro. Just one word more. In going over the operations of our power house, data that is drawn up for my own information yearly, I found that owing to the increase of this business I have been speaking of—I attribute it mainly to that, because the year's increase has been along that line entirely—the yearly load factor on our plant for the year 1911 had been increased from 24% in 1910 to 33% in 1911, which is a pretty good showing for a small plant.

Mr. Rollins. I feel that I am somewhat of a pioneer in the house wiring game myself, having started with success about 10 years ago a house wiring campaign in Hartford. I advertised in the local papers to wire a certain number of outlets for a fixed price, I believe the price at that time was $30. for 6 rooms with fixtures, however additional outlets were wired at a cost of from $3. to $3.50 each. The results were that the average prices for wiring a house was something like $50. instead of $30. It is up to the central station to get busy and send solicitors out on a campaign and get the business that is awaiting them and turn it over to the local contractors. That has always worked out successfully with me.

There is a small place in this Commonwealth by the name of Worcester with about 150,000 population, with the President's permission I should like to call upon some of the local contractors, who are here as guests, to state their side of the case. I will call upon Mr. John P. Coghlin.

Mr. Coghlin. I hardly know what to say, as my friend from Providence has covered the field very fully. I will be glad to meet him later and talk over our situation with him and compare our conditions with his. I do not like to be personal in a discussion of this sort, but my friend from Brattleboro has brought home to me the fact that illustrates the situation very well indeed. This "houn' dog" of a contractor has been kicked around by manufacturers, jobbers and central station men. We had an experience in Brattleboro a few years ago with a contractor there, who was unable to make a living even if he did not pay for his goods. The situation is, that in order to be an aid to the central station, the contractor must get enough business and at a profit so that he will be able to make a respectful living, and the better living he makes, the better assistance he will be to the station.

A great deal of these situations are like the tariff and are local. In the larger cities, the labor propositions enter into it to a larger extent than in the smaller cities and towns. When I started in wiring in 1892, we used to wire factories and allowed 15 to 20 drop lights per day, per man. The average workman today, with a helper, won't put up eight. This causes the material increase in the cost of wiring in large cities and the labor cost appears to be increasing every year. In these cities or towns you have to pay $3 or $4 and in some cases, $5 a day for eight hours' work, and it seems the higher you pay, the less amount of work you get out of a man per day. With that class of labor you cannot wire up cottages and furnish them complete for $30 per cottage.

We deal in fixtures and job them. We also job electrical supplies, and we believe that we are buying our goods right, otherwise, we would be unable to job in competition with jobbers and manufacturers. Last summer the demand meter business came to Worcester. Their representative came from some western town. He had been putting in meters and taking contracts for wiring and gave us to understand that we were charging altogether too much for our work. The contractors got together and did some figuring. The result was that there was not enough of this work coming in to keep 10 or 12 contractors busy as it was divided up. We feel that if one or two contractors could do all the work so they could keep a gang busy all the time on that kind of work, that we could do certain cottages for from $25 up, but an average cottage with decent fixtures, will run nearer $60.

I did not know of this meeting until day before yesterday when I received a telephone message from Mr. Rollins asking me to come to Springfield. He told me what the program was and I immediately telegraphed Mr. Barnes, President of the National Electrical Contractor's Association, W. H. Morton, Secretary of the National Electrical Contractor's Association, and Mr. Andrews, President of the Massachusetts State Association, but have not seen any of them here yet. I wish that the contractors had had a chance to have read this paper and had an opportunity of discussing it from their viewpoint.

The contractor is between you and the consumer, and is oftentimes in a position where he can influence the consumer one way or the other. As a general proposition, the central station is a large corporation with high priced managers and superintendents who are in a position to educate and influence the contractor, who is invariably a workman who has left your employ or some other contractor's employ and started in business for himself. He has no business experience and little or no capital. The station manager should assist him in the business end, show him how to figure costs, start a cost system of bookkeeping, be sure that he puts the actual cost against every job that he figures and see that he makes something on every job that he does. If you make him earn money and he has the ability, you have a man working for you that is not on your payroll, and every job that he succeeds in landing makes a customer for you. The trouble in the smaller towns and cities is that there is more or less feeling between the contractor and the station man, due to petty jealousies, or the fact that the contractor at one time had been in your employ, or various other things. These should be immediately eliminated.

The National Electrical Contractor's Association investigated a great many cases where central stations have gone into the contracting and are doing wiring, and they found invariably that where they did wire cheaper than the contractor, they did not charge any overhead expenses, any superintendent's expenses, and oftentimes material and labor was not actually or correctly charged. Now our contention is this, that if you want to get more customers and are willing to do the wiring at less than cost, let the contractor do this work for you and pay him the difference, for instance, if you will wire cottages complete for $30 and lose $10 or $15 per cottage (for you cannot do it any cheaper than the contractor) give the contractor this job to do at his price, and pay him the difference.

The National Electrical Contractor's Association has made out blanks and asked the contractors throughout the country, to fill these in. These blanks call for the amount of business a concern did, itemized their overhead expenses, and when these blanks were turned in (something like 800 replied) they divided them into four classes, a class of contractors doing less than $10,000; $10,000 to $25,000; $25,000 to $75,000 and a class for those doing above $100,000, or something like that, and it was found that the overhead expenses of the largest contractors was something like 17-1/2% and that some of the smallest contractors ran as high as 40%.

I believe that the lighting companies in the larger cities today are recognizing the position which the contractor holds. The Edison Electric Illuminating Company of Boston, years ago, gave lectures and luncheons and got the contractors together and from what I hear today, New Haven & Providence are doing the same thing. Worcester has done something of this sort, but not as much as we hope for. I believe that the central stations should confine their entire efforts to selling current, that they should not sell a single supply of any kind, even lamps, that if the contractor is unable financially to carry sufficient stock, the station should carry it for him or help him out in some manner.

Mr. Schwabe. I want to take the part of a small central station and I want to say that the only successful campaign we ever ran was a cheap wiring campaign that began with a $20 proposition. I do want to say that out of forty contracts we took only one of them was taken as $20. The contracts in one of the little towns that were taken averaged to the contractor $60 per job. In other words, we have to use the low proposition as an entering wedge to interest the customer or consumer of small means. We also have to assist the contractor. The contractor in the small town naturally is limited in capital, and the central station must assist him. In this campaign we paid the contractor for the job, and the customer paid us, and if he didn't, why we were stuck as far as the contract was concerned. We took this proposition with a first payment of $5 down and the balance in ten monthly installments. The contractor in this case had no risk and no overhead charges. We did the soliciting, took the contracts, took the agreements for additional work, which the consumer paid to him directly. In one instance the customer made a contract with us for $30 and an additional contract for $74 with the contractor, which was paid him at the completion of the job and we paid him our $30, although this customer paid his $30 to us in installments. The point is that we must get the small contractors to feel that their interests are similar to the interests of the lighting company and that they need help and assistance, and if you get a good contractor in a small community help him along. You will derive great benefits in the way of smoothing out small discrepancies that consumers talk about, but that don't get to your office. They tell the contractor about some grievance and you will have the contractor's co-operation who will help to smooth out these matters. I want to emphasize again that the low price proposition we put out has been the only successful one, although we took no contracts at those low figures. We started the people, got them interested, and the contractors were perfectly satisfied with our proposition.

The two contractors who did this work in two of our towns are here today as our guests.

Mr. Gibbs. It seems to me that Mr. Schwabe has struck one key note in connection with this matter of the getting together of central stations and contractors. There are too many managers of plants, there are too many men holding jobs of different kinds with central stations—even advertising men—who think that the permanency of their positions depends on spending the company's money instead of saving it. And too many managers spend the company's money instead of saving it by adding expensive kilowatt hours to the system, as was shown in the paper yesterday. There is absolutely no use now in central stations trying to give the people something in order to stimulate the use of electric service; we don't have to do that any longer. If you want to go into a wiring campaign on which you are bound to lose money, get together with your wiring contractors, just as Mr. Schwabe did, and fix it up with them. Make any price you want to your customers, but see that the contractor gets off all right, and charge the difference to your advertising account where it belongs. Another thing that the central station men want to keep in mind. Practically all wiring contractors today are men who have come up in the business because of their business sagacity and their careful, faithful, reliable work. But the men that you have got to get in touch with and the men with whom you are having trouble now are the men who have never learned salesmanship. You find a successful wiring contractor and he is a salesman, or if he is not, he knows enough to know it and he hires them. They can work and they don't need anything from you except your sympathy and interest in facilitating installations. That makes them happy and the customers happy. When the wiring contractor goes to the telephone and calls up your office, he throws out his chest. The woman of the house is there looking on. Perhaps the close-fisted owner of the house is there following him around from room to room. He goes to the telephone and says to himself, "Here is where I make a hit." He says, "I have got this job all done. Can you put the meter in right away? This man wants to move in at once." You say, "I don't know. We are pretty busy just now. May be we can get it in for you sometime next week." It is all off with the contractor. That meant good will for you, the good will of the customer. Get your meters in if it costs you money. The gas companies all over the country are beating us every day. Now on the matter of salesmanship. You have your own solicitors. If you haven't, you have got yourself and you have time enough if you leave some of your office work to a $6 boy to go around and see the contractors and what they are doing—drop around and see the job. If you have a small central station there is no excuse for your not doing it. Go in and help the contractor to throw his front. By paying personal attention to your customer, he is going to be a booster for you until he dies. You must be a salesman yourself, or you can't help your contractor. Go with him, give him clinching arguments. If you have got salesmen, make them go with him. We can be good fellows, companions, chums, with these fellows. Don't suspect your salesman of getting something on the side because he happens to be able to walk up to a contractor on the street and slap him on the back, and call him a good fellow. Rely on the salesman for being honest; if you pay him enough, he will be. You can give your contractor all the time he needs on salesmanship, can tell him about these things, keep him in touch with things that are going on and make him feel that he is a part of your company. Get into good fellowship with him, and above all things, if you want to make a campaign on flat-irons, heating pads, dish washers, percolators or anything of that kind, or on house wiring, see that the contractor gets his share.

PRESIDENT SANDS. It seems too bad to have to close discussion of this paper. I know there are many here, both central station men and contractors, from whom we should like to hear, but we have already stolen forty minutes out of the afternoon session and I don't like to go any further. The subject of Mr. Hayes' paper is very important as we all know and I believe this discussion is bound to pave the way for a clearer understanding between central station men and contractors throughout the territory.

The next paper is "The Exhaust Steam Turbine as Applied to Electric Lighting," by Mr. W. R. Eaton.

EXHAUST STEAM TURBINE AS APPLIED TO ELECTRIC LIGHTING

By Walter R. Eaton.

Cambridge Electric Light Company, Cambridge, Mass.

The intention of this paper is somewhat broader in its scope than the title indicates. As a matter of fact it treats of the whole installation from the throttle-valve to the switch-board. On the other hand, because the units described were selected to attain certain results under conditions which might not be found in all stations, it does not undertake to establish any universal rule for applying the exhaust turbine to the lighting industry. The unit as a whole was expected to give better regulation, better engine efficiency, to make a reduction in water bills, and, by improving the engine load factor, to improve the station efficiency; rather a large contract, it would seem, especially when one remembers that the prime movers of the Cambridge company are acknowledged to be among the best types of reciprocating engines. Figures, however, show that exceptations have been realized to a marked degree and once more the turbine has demonstrated its fitness for central station work.

The comparatively small size of the unit and the exceptional engineering ability employed to determine the preliminary questions seem a warrant to the writer for giving many details not usually found in a strictly technical paper. This is done to benefit, if possible, the small companies that cannot always afford expert advice. Investigations, covering nearly all the installations of exhaust turbines east of the Mississippi river, satisfied the management that the particular type of turbine was of less moment than the condensing apparatus and that an independent method of excitation was preferable in many respects to a motor driven set, especially as the steam used in driving the independent set could be expanded to its greatest volume in the exhaust turbine. For these reasons, a diagramatic plan was prepared and, with the acceptance test of the engine, sent to the manufacturers. They were requested to submit prices and guarantees for the exciter, the turbine and the condenser separately.

You will note how the high pressure steam divides three ways and, after doing part of its work, reunites to pass through the separator and turbine.

The question "How much steam at "A" will it take to produce at "B" 1000 useful K.W. at 80 per cent. power factor?" seems simple enough, yet some of the manufacturers did not so regard it, and asked for guarantees on the engine efficiency. This is a very important question and one that should be given due consideration before close results can be predicted.

DESCRIPTION OF UNIT.

The original unit consisted of a McIntosh-Seymour vertical cross compound engine (Size 18x38x42, R. P. M. 120) connected to a General Electric, 500 kilowatt, 3-phase revolving field generator. The engine exhausted into a small feed water heater, below the engine room floor, thence to a vertical compound Blake jet condenser.

The Heater was replaced by a Cochrane separator and the Blake pump supplanted by the following apparatus: A 500 kilowatt horizontal mixed pressure turbine (R. P. M. 1800) exhausting through a 28″ Wainwright expansion joint into a Worthington surface condenser. The turbine sets upon the floor with no special foundation except a reinforcement of the floor I beams by two vertical columns in the basement. The condenser is cylindrical in form and has 2750 square feet of cooling surface. The tubes are brass, 3-4″ outside diameter,

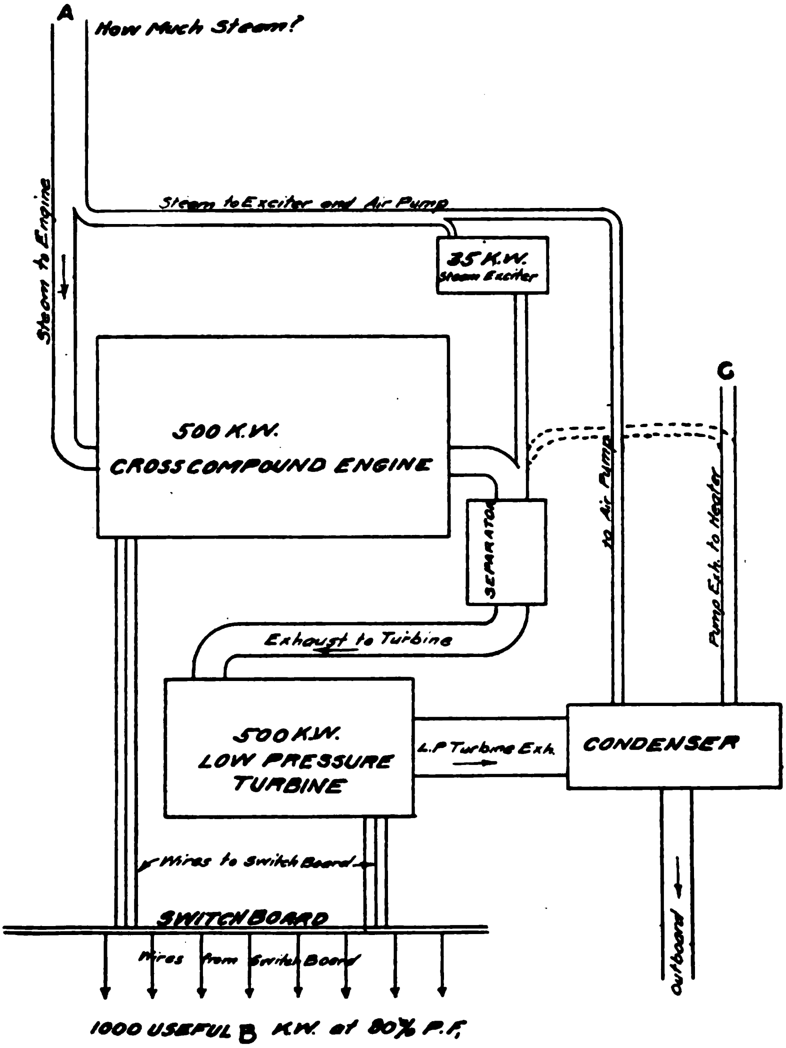

A
How Much Steam?
Steam to Engine
Steam to Exciter and Air Pump
35 K.W. Steam Exciter
500 K.W.
CROSS COMPOUND ENGINE
C
to Air Pump
Pump Exh. to Heater
SEPARATOR
Exhaust to Turbine
500 K.W.
LOW PRESSURE TURBINE
L.P. Turbine Exh.
CONDENSER
Wires to Switch Board
SWITCHBOARD
Wires from Switch Board
Outboard
1000 USEFUL B K.W. at 80% P.F.

DIAGRAM No. 1

number 18 stubs gauge. The Tube heads are Muntz metal. The cylinder is supported about 8 feet above the basement room floor upon two cast iron saddles and 4" columns, directly below the turbine. It is fitted with an inner cooler for cooling the dry air and has a hot well from which the condensation is pumped.

The condensing water is brought from a well connected with the river by a covered sluiceway. From this well it is drafted about 135 feet through a 14" pipe by means of a Worthington volute pump with a 10" injection, designed to deliver 2400 U. S. gallons per minute. This pump is driven by a Blake 20 H. P., 6 inch x 6 inch vertical reciprocating engine running normally 240 R. P. M. After putting this pump into service so much foreign matter (such as moss, fish, sticks, etc.) reached the condenser tubes that it was found necessary to insert in the intake, a twin strainer, one side of which could be removed and cleaned while the other was in operation. Since this was done, there has been no trouble. The outboard discharge pipe is about 150 feet in length and 12" in diameter, the end of which is water sealed by carrying it below the river level, thus giving a syphon system of circulation.

The wet vacuum pump is a 2" two step turbine hot well pump, driven by a 4 H. P. Terry steam turbine revolving 1500 turns per minute. The reclaimed water from the hot well is sent to a cylindrical feed water tank, located in the basement. This tank acts as a reservoir from which all the water evaporated by the boilers is pumped through a hot water meter. The extra water which the boilers require is fed into the tank from the city mains, through a second meter, so that the amount of water saved can be determined at any time by deducting the readings of one meter from the other.

The vacuum is maintained in the condenser by a 6"x14"x12" single horizontal straight line rotative dry vacuum pump with a 6" suction and a 4" atmospheric discharge.

PIPING.

The general piping scheme was designed so that the ex-

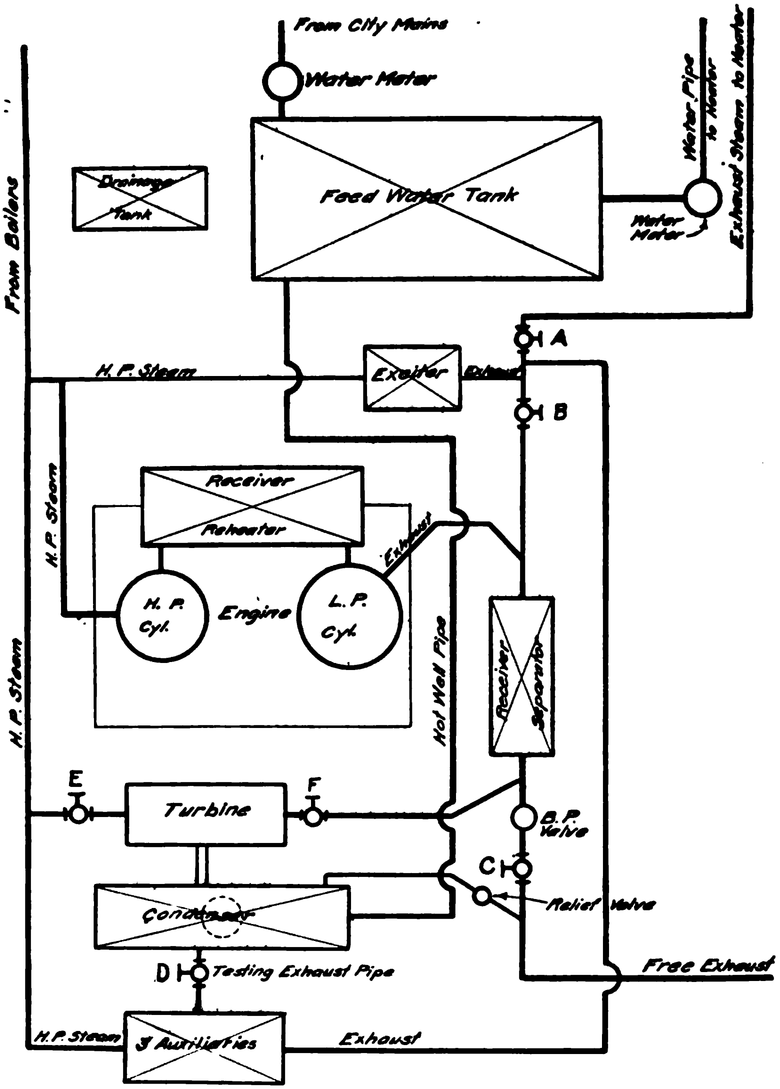

From City Mains
Water Meter
Water Pipe to Heater
Exhaust Steam to Heater
Drainage Tank
Feed Water Tank
Water Meter
From Boilers
A
H.P. Steam
Exciter
Exhaust
B
Receiver
Reheater
H.P. Steam
Exhaust
H.P. Cyl.
Engine
L.P. Cyl.
Hot Well Pipe
Receiver Separator
H.P. Steam
E
F
Turbine
B.P. Valve
C
Relief Valve
Condenser
D
Testing Exhaust Pipe
Free Exhaust
H.P. Steam
3 Auxiliaries
Exhaust

DIAGRAM No. 2

haust of the exciter and auxiliaries can be turned either into the water heaters or to the engine exhaust and, when the turbine throttle is closed, into the atmosphere. In addition, for testing purposes, the condenser auxiliaries have an exhaust into the condenser.

By the diagramatic plan here shown, you can see that if the valve "A" is closed and "B" is open, all the exhaust steam is turned through the separator into the turbine and, by reversing the operation, it goes to the Heaters in the boiler-room.

By opening "C" and closing "F" everything goes to atmosphere. When "D" is opened, the exhaust from the auxiliaries goes into the condenser.

The acceptance test of this unit was made in June of last year. It consisted of four runs of four hours each with the ordinary station load. The following results were obtained which are compared in parallel column with the acceptance test of the main engine, made May 1, 1904.

	Turbine Unit.	Engine.
Lbs. of Water per hour from condenser	18,398.00	11,771.00
Moisture by Calorimeter	2.46%	
Moisture by Calculation	3.27%	
Drain from Receiver	173.00 lbs.	65.90 lbs.
Drain from Separator	408.00 lbs.	616.00 lbs.

STEAM.

To Circulating Pump	475.00	
To Wet Vacuum	250.00	
To Dry Vacuum	150.00	
	875.00	

PRESSURES.

At Engine Throttle	158.00	139.50
At Receiver Absolute	39.37	25.80

	Turbine Unit.	Engine.
At Turbine	16.77	
In Condenser	.883	
Barometer	29.65"	
Vacuum	28.19"	26.27"

TEMPERATURES.

At Engine Throttle	421.3°	434.80°
Superheat	51.6°	75.00°
At Receiver	260.7°	241.70°
At Turbine Throttle	218.5°	Exh. 125.20°
Of Injection Water	68.0°	56.27°
Of Discharge	86.0°	90.26°
Of Condensed Steam	90.0°	
Of Room Temperature	95.0°	

SPEEDS.

Main Engine	119.20	119.10
Turbine	1,795.00	
Piston (Feet per minute)	834.40	833.70
Buckets (Feet per second)	425.00	

LOADS.

Indicated H. P. High Pressure Cylinder	606.00	347.10
Indicated H. P. Low Pressure Cylinder	308.00	368.40
Total	914.00	715.50
Percent Power in High Pressure	66.00%	
Electric load on engine in K.W.	603.50	485.00
Electric load on engine in H. P.	809.00	651.00
Efficiency of Engine alone	88.60%	93.4%
Electric load on Turbine in K. W.	493.50	
Total load on Unit in K. W.	1,097.00	
Power Factor	.796	

EFFICIENCIES.

Steam per I.H.P. in Engine	19.81	13.53
Steam per K.W. in Engine	30.00	
Steam per K.W. in Unit, Excl. of Aux.	16.86	19.52
Steam per K.W. in Unit, with Aux.	17.30	22.21
Steam per K.W. in Auxiliaries	.80	2.69

After correction for moisture and vacuum, the steam consumption in the turbine was found to be as follows:

Steam to tur. as weighed per K.W	37.28
Steam corrected for moisture by calorimer	35.45
Steam corrected for vacuum	36.02
Steam corrected for moisture as calculated	34.84
*Steam corrected for vacuum	35.41

*This figure has been assumed to be the nearest correct and taken for the turbine efficiency.

A number of runs were made with the turbine at varying loads and a complete set of data obtained for the half load. The most important of these are here given:

Electrical load on engine in K.W.	302.50
Electrical load on turbine in K. W.	256.50
Total load on Unit in K.W.	559.00
Power Factor	.727%
Steam on tur. as weighed per K.W.	42.67
Steam corrected for moisture by calorimeter per K.W.	40.75
Steam corrected for vacuum per K. W.	41.35
Steam corrected for moisture by calculation per K. W.	40.63

Steam corrected for vacuum per K.W.	41.23
Steam on Unit, without Auxiliaries per K. W.	19.59
Steam on Unit with Auxiliaries per K. W.	20.39
Steam on Auxiliaries	.80

The various Units of the Cambridge Station are given below:

No. 1. Unit Engine and Turbine, 500 K.W. each	1,000 K.W.
No. 2. Unit Reciprocating Engine	500 K.W.
No. 3. Unit Reciprocating Engine	1,500 K.W.
No. 4. Unit Reciprocating Engine	2,000 K.W.

A glance at the above arrangement of units will indicate at once how it was possible to improve the engine load factor by the installation of the exhaust turbine. The various sized units also afford a most excellent opportunity to compare the unit under discussion with reciprocating engines under a variety of conditions. The appended table shows how very favorable such comparisons are to the turbine set.

	No. 1. Full Load	No. 1. Half Load	No. 1. Main Eng. Full Load	No. 3. Half Load	No. 3. Full Load
Load in K.W.	1097.	559.	485.	787.	1543.
Steam per K.W.H. without Aux.	16.86	19.59	19.52	18.59	17.72
Steam per K.W.H. with Aux.	17.3	20.39	22.21	22.6	20.3
Lbs. steam in favor of No. 1. Full Load	0.0	3.09	4.91	5.3	3.
Lbs. steam in favor of No. 1. Half Load	-3.09	0.0	1.82	2.21	-.09

During the daily operation of the plant, many tests have been conducted to ascertain the water rates and temperatures of the steam used in the auxiliaries. From the data thus obtained the costs of running this portion of the unit have been calculated under the following conditions of exhaust, to atmosphere, to condenser, to heaters and to the separator. The table below gives these costs in cents per hour of operation.

In establishing these costs, the following methods were adopted. Fixed charges were taken at 12-1/4% not only on cost of condenser but also on cost of piping and changes made necessary by installing the surface condenser. The costs for atmospheric exhaust were obtained by weighing the total water consumption.

In order to obtain the costs when the auxiliaries were exhausting into the condenser, it was assumed that all the steam was expanding in a single cylinder with a 5/8 cut-off. A card was constructed under these conditions for 160 lbs. initial pressure and 15 lbs. absolute back pressure. From this card, a new cut-off was found for a card of equal area with 160 lbs. initial and a back pressure of .785 absolute. The ratio of the two cut-offs was found to be about 82%.

In obtaining the figures for exhausting to the heaters, the total heat units of the exhaust less the loss by radiation were charged to the boilers through the heaters.

When exhausting to the separator, the steam was reduced to K.W.H. at the switch-board which was found to be 14 and the auxiliaries were credited with this amount at 8-1/2 mills per kilowatt hour.

The price of coal in the boiler room was taken as $4.96 per ton and the water costs $ .08 per 100 cubic feet.

Since the installation of this unit, the station records have been carefully examined and special runs made to learn its value under operating conditions and to obtain data that would help in making future extensions to the station along the same lines.

By means of the records, it is possible to reach the last court, the coal pile. This winter's log shows just 10% saving

	Exhausting to Atmosphere	Exhausting to Condenser	Exhausting to Heaters	Exhausting to Separators
Interest, Depreciation &c., per month........	$83.02	$83.02	$83.02	$83.02
Fuel cost for 570 hours run................	91.20	74.10	18.81	91.20-67.83 23.37
Attendance and Oil......................	9.50	9.50	9.50	9.50
Water	4.56	Reclaimed	4.56	Reclaimed
Total cost per month....................	$188.28	$166.62	$115.89	$115.89
Cost per hour run......................	.33	29 1-4c.	20 1-3c.	20 1-3c.
Estimated value of water reclaimed..........	.24	24c.	24c.	24c.
Estimated net cost per hour................	.09	5 1-4c.	Profit 3 2-3c.	Profit 3 2-3c.
Actual value of water by meter.............	.14	14c.	14c.	14c.
Actual cost of operating per hour...........	.19	15 1-4c.	6 1-3c.	6 1-3c.

in coal consumption per kilowatt hour over the records of last winter. This saving is attributable to three causes, viz.:—the installation of stokers, under some of the boilers, the efficiency of the turbine set and the better load on the engines. The exhaust turbine is without doubt responsible for the last two items, and should be given credit for about one-half of the saving. That this is not too large a percentage is proven by a week's run without the turbine when the coal consumption per kilowatt hour increased 6%.

When this unit is excited by a motor driven set 1200 kilowatts at 76% power factor is the full capacity of the outfit, while, when the excitation is furnished by the independent steam set and its exhaust is turned into the turbine, 1250 kilowatts can be easily handled. With a power factor under 76% the capacity of the turbine generator is not over 375 to 400 kilowatts.

The results obtained from the tests and operation of the unit described indicate that the most important points in the selection of the complete outfit are a study of station conditions—in order to obtain the proper size and type of turbine to give the highest station efficiency. The generator should have its point of saturation sufficiently high to operate well under conditions of poor power factor when such conditions are apt to occur. The selection of the condensing apparatus is dependent to a great extent upon the cost of feed and circulating water. Steam excitation is preferable for three reasons:—First. The fluctuations of voltage due to speed variations are not multiplied as is the case with a motor driven set. Second. When a short circuit occurs on the lines, the generator is not as liable to lose its load or "lay down" as the saying is. Third. Except in case of accident to the exciter itself, the load can be picked up more readily when a shutdown does occur than when the exciting unit is dependent for its power upon the main unit.

President Sands. I know we are all interested in this paper. A 10% saving in the coal bill is interesting to all of us and in the discussion some of us may find how to save that 10%. The paper is now before you.

Mr. Carpenter. I was particularly interested in this subject, because it is one I have had some firm convictions on ever since I heard a paper by Mr. Stott discussed before the Mechanical Engineers Association in Boston about four years ago. Of course, as central station men, we have to take the claims of the reciprocating engine man, the turbine man, and the exhaust turbine man and put them all together and consider them with the different attitudes of the man and see what we can sift out. It has always seemed to me, in the small way I have looked at it, which is the way I have started, that high pressure steam, which is practically a gas, works most effectively in a confined chamber. Then as they get nearer the condenser, the steam becomes more or less saturated, and we should put in our water wheels at that end. Not until I found out just the combination I had been looking for was I satisfied as to the proper layout for some of the small propositions we have been working out. I went to Colorado Springs, where they have compound condensing engines, high pressure and low pressure turbines, and there, by getting the tests made by the company themselves, without any relation to the manufacturers, I found the compound condensing engine and low pressure turbine gave the best overall efficiency that could be produced by any possible combination. I do not presume to enlighten this assembly at all, but would like to give a few ideas we have planned to adopt in an insignificant station with which I am connected. I was interested in Mr. Eaton's statement that he got a higher efficiency by putting the exhaust from the auxiliaries into the superheater, then through the low pressure turbine to the condenser than he did by putting it into the heater. My own convictions have been along those lines. We have gone just one step further, and in the station we are now building, have planned to have the auxiliaries large enough so that we practically get only four to five expansions in our auxiliary cylinders. We plan to put the auxiliary exhaust into the receiver, so that we get about four more expansions in the low pressure cylinder. Then the steam goes through the turbine to the condenser. In addition to that we have a scheme of heat conservation which is planned, although we may not have it in full operation for nearly a year. We have a two stage or section economizer, and the section nearer the boiler will be a superheater. After taking as much of the oil as we can out of the exhaust from the reciprocating engines, we intend to run it through that first section of the economizer, going in at the bottom on the stack end and coming out at the top on the boiler end. We hope to dry out the steam and possibly superheat up to 450° or 500° F. Then we run that superheated steam through a low pressure turbine to the condenser, that will be right close to the low pressure turbine. We believe that will increase our efficiency materially. There is quite a little entrained water comes out of the separator and it seems to me if that is re-evaporated and superheated, it will save a large part of the heat which now escapes in the waste flue gases. After the gas has gone past the superheater and the second section, which will be a feed water heater, we look for a very low terminal gas temperature. Bringing the stoker engine exhaust and that of the other auxiliaries as planned, into a piping system, having 15 to 20 lbs. gauge pressure at times, we can exhaust them out into the atmosphere or into the receiver between the high pressure and the low pressure cylinders of our reciprocating engines. Of course you are all familiar with the Taylor Stoker. We have adopted this as our standard. We are going to use a heat conservation and ventilation scheme which in part is used on ship board, in some cases. We intend to take fresh air into our engine room and the current of air will pass into the boiler room, which will normally be closed. Instead of having monitors on our roof, and allowing all this heat to escape, we shall have blowers of the suction type, and will draw our air, from directly under the roof near the stack and feed it to the stokers, which will save the heat that would be required to warm up cold air supply for the combustion chamber, and we feel this will mix better with the volatile gases than cold air would. As we do not plan to overload our boilers, we expect no troubles from this extra heat. Another new feature is a low stack, whose top is only 36 feet above the boiler room floor. This is unusual practice but we feel that a high stack which would create a good natural draft would cause an attenuation (or stretching, if you please) of the gases in the economizer sections which would prevent a proper transference of heat to the exhaust steam and feed water. All this puts a little more duty on the blower and engine but we feel that this will prove to be good engineering. We think we have every stray B. T. U. quite thoroughly fenced in. We expect that a year from now this insignificant station will show unusual results as regards the ratio of B. T. U's. to kilowatt hours.

Mr. Clark. I do not wish to discuss the present paper, but to speak on the low-pressure turbine as adapted for use in existing central stations. In the classification of these existing stations, there are in the main two types to be considered, the division being according to the type of installation. In the older stations, the engines were belted to jack-shafts, from which was driven the electrical apparatus. This older type of station means engines of older construction, and it would be very questionable whether their life could be sufficiently prolonged to justify the installation of low-pressure turbines. On the other hand, about ten to twelve years ago, direct-connected steam engines were in vogue, and many of these engines are in good condition. Equipping one of these latter engines with a low-pressure turbine practically doubles the capacity of the station, giving good economy over a very wide range of load.

Most of the generators put in at the period referred to were not designed for operation on low power factors, as general recognition had not then been given to the importance of this feature, due, probably to the fact that the loads carried at that time were largely lighting loads. Since the motor load has come on to central station lines, these generators are unable to carry overloads with low power factor, and therefore the installation of low-pressure turbines with large generators may bring about very desirable regulation features in such central stations, since by the over-excitation of the turbo-generators, the idle current can be taken up and the capacity of the engine-type generators materially increased.

In connection with these direct-connected units which are suitable for use with low-pressure turbines, there are various conditions which demand proper engineering in the application of the low-pressure turbines. Some of the most important of these features I will mention: Where an engine has a very large cylinder ratio, say 4 to 1 or above, it may be desirable to expand the steam in the engine cylinders to a terminal pressure below atmospheric, making the inlet pressure of the low-pressure turbine at a slight vacuum, in order not to loop the card on the low-pressure cylinder when running practically non-condensing. The majority of engines in central stations are not using better than 25 or 26 inches vacuum. It can readily be seen that a low-pressure turbine could be designed to operate from the 25 or 26 inches vacuum at the exhaust of the engine to a 28 or 29-inch vacuum, condensing apparatus being installed to obtain these vacua. The heat range, however, is so small that the amount of power to be derived does not make such a turbine installation commercially valuable. It might, however, be commercially valuable to operate a low-pressure turbine between 10 and 28 inches vacuum, although there would not be as much gain in power as though the engine ran against about atmospheric pressure. The best rating of a 4 to 1 ratio engine, non-condensing, would, in general, be at a point about 25 per cent. higher than its rating condensing, so that to run the engine against atmospheric pressure makes possible 25 per cent. overload on the rating of the existing generator. As already stated, with the larger quantity of steam coming from the engine when running non-condensing, a low-pressure turbine could be used and practically double the rated output of the existing unit, and the curve of the economies per kilowatt would be very flat over a very wide range of loads; a matter which is of considerable importance to central stations.

The usual and best practice is to run the low-pressure turbine without a governor, in parallel with the engine unit; the governor on the engine doing the regulating for both the turbine and engine; the low-pressure turbine putting into the line all the power it can develop with the amount of steam going to it. In this way, if a small amount of steam is going to the low-pressure turbine the vacuum will pass through the turbine and come back to the engine, enabling the engine to carry its load more economically, and making a good expansion of the steam from the inlet pressure to the exhaust, without looping of the cards or doing negative work.

It does not, in general, pay to put in a low-pressure turbine with an engine, where the vacuum available for the turbine is less than 25 or 26 inches, providing the engine is now condensing. It is quite possible, with modern condensers, to obtain 28 inches vacuum, with the same quantity of water that was formerly required to obtain 25 or 26 inches vacuum on the engine units when using the older types of condensers.

There is present in the steam going from the engine exhaust to the low-pressure turbine considerable moisture, owing to the work done in the engine, and this moisture should be removed before the steam goes to the low-pressure turbine, as the turbine loses in economy two per cent, for each one per cent. of moisture in the entering steam. It is of great importance, therefore, to put in a properly designed steam separator between the engine exhaust and the low-pressure turbine inlet, and in one case where we have put the engine exhaust through an economizer, used as a superheater, the combined outfit,—which in this case consisted of simple engines and a low-pressure turbine,—was enabled to attain the economic results of compound engines with a low-pressure turbine, so that there would be a marked gain if we could remove the moisture and superheat the exhaust from compound engines before it goes to the low-pressure turbine.

It might not be out of place to state here why the combination of high-pressure engine and low-pressure turbine is so economical. The engine gains about 20 per cent. in Rankine cycle efficiency, when running non-condensing, over its condensing economy, while the low-pressure turbine can utilize the heat drop to high vacuum with the same efficiency, and the combination gives the best results over a wider temperature range.

Mr. Clifford. It is my purpose to suggest one or two points concerning the electrical features of the low pressure turbine installation, and I am glad to refer at this time to the importance of Mr. Elden's paper on power factor, because what I have to offer in part concerns low power factor. The induction generator, as sometimes used in such an installation, is a piece of apparatus which must have exciting current, naturally, and this exciting current is a demand for lagging current from the synchronous apparatus on the system. Now if it happens that the synchronous apparatus installed, previous to its being coupled with the induction generator, is running high on the saturation curve, it may be that the necessity of securing the exciting current for the induction generator will carry you so far over on the flat part of your saturation curve as to render operating conditions absolutely impossible. We hear frequently about the 59th St. station of the Interborough Company as being typical of the application of the induction generator and low pressure turbine. The interior of that station was almost ideal from the standpoint of the installation of the induction generator with its coupled prime mover, the low pressure turbine. The station was laid out on generous space lines. There was ample room for the installation of the low pressure turbine, and pipe redesigning was not very complicated. But most important of all is that with the Interborough system, due to rotary sub-stations on the system, it is possible to get a very considerable proportion of the exciting current from the synchronous apparatus of the sub-stations rather than to make the demand on the synchronous generators in the stations themselves. That increased demand of exciting current,—lagging current on the generators, that is—would naturally depend on the characteristics of the induction generator.

There is another difficulty however, also electrical in character, and that is the effect of short circuit. Short circuits are likely to take place, or are possible of occurrence, in even the best regulated power stations. What is the condition which exists under short circuit, where we are operating in parallel synchronous generators driven by reciprocating engines, and induction generators driven by low pressure turbines? If a short circuit occurs on the system, the synchronous apparatus immediately begins to pump current into the short circuit, and this gives an increased steam demand through the reciprocating engine. This steam will flow through the exhaust turbine. Meanwhile the induction generator loses its field and absolutely refuses to deliver electrical energy to the system. That is, it loses its load. I want to ask Mr. Eaton if this situation occurred to him in considering the Cambridge plant, and what scheme suggested itself in order to prevent the low pressure turbine from running away due to the induction generator losing its load under short circuit, also if this influenced the final layout. In closing I merely wish to say that although this induction generator and low pressure turbine proposition is admirable under special conditions, the question of demand for exciting current coming as a lagging current from the synchronous apparatus on the system, is one that requires most careful consideration. I should like to ask, as helpful to one called upon to make quick estimates, what the thermal efficiency of the combined unit is.

Mr. Eaton. I don't know as to the thermal efficiency, because I have not dipped into that question to any extent. We have those efficiences on blue prints at the office but I could not say offhand what they are. As regards excitation, we simply have adopted the practice of exciting both units from one steam driven set, and we have no synchronous apparatus except the generators upon the system. If we get a short circuit, which we have not had as yet, we expect the unit would lie down just as any other unit we have in the station. They are apt to drop their load, although we have never fully lost it yet. We have always been quick enough to pick it up.

Mr. Mosman. I think Professor Clifford is laboring under a misapprehension. The low pressure turbine generator at Cambridge is a synchronous generator, not an induction generator, hence, if excited, it will work like any other synchronous generator. The Interborough plant is, so far as I know, the sole instance of use of the induction generator on the low pressure turbine. It happened to suit the case remarkably well because of the large excess capacity in the generators that were installed with the engines, and because of the high power factor of the load. Those generators had sufficient excess ampere capacity to furnish exciting current to the induction generator. I don't think as a general proposition that there is much excuse for installing induction generators. There will be a few cases, such as where the generator on the prime mover has great excess of ampere capacity. In that case the induction generator may be used and its excitation will draw on the excess of ampere capacity. In other cases the synchronous generator will prove better. One other point: I may have misunderstood Mr. Carpenter, but I thought the intent of his remarks was that it is better to install an engine driven unit and low pressure turbine because of the better economy, the flatter water rate curve, et cetera. It seems to me that in most cases the opposite will prove true, because of the greater saving of space, cost of buildings, foundations, piping, et cetera, due to the installation of a high pressure turbine, and that this would outweigh any difference between the efficiency of the combined unit and that of the high pressure turbine.

Professor Clifford. That meets my point—the change in the type of generator.

AFTERNOON SESSION, FRIDAY, MARCH 22.

President Sands. The last paper which is by no means the least, deals with a topic which is of very great interest at the present time to the central station industry.

THE DEVELOPMENT OF ELECTRIC VEHICLES IN NEW ENGLAND

By Fred H. Smith.

Worcester Electric Light Co., Worcester, Mass.

The early history of the electric vehicle is extremely pitiful, not only because the history is itself pitiful, but because it is pitiful to comprehend that a body of men such as are included in this organization have not earlier taken the steps necessary to bring the vehicle industry to a plane where it was mutually attractive to the purchaser, the manufacturer and the central station.

In the past, the manufacturer did not co-operate with the central station, but independently sold a vehicle, and that was all he sold. The purchaser was not properly instructed, if at all, in the operation and care of his car, but was left without mercy to his own ignorance or the incompetent help afforded at a public garage. This could only result in one thing—Failure. The electric vehicle was black-listed, as well as every one who advocated its use. Naturally, the bulk of this stigma reflected upon the central stations, who were supposed to be in a position to expertly attend to all questions either electrical or where electricity was applied in any manner. But the central station was not wholly competent to deal with the complexity of problems presented for its solution. The proper application of electric vehicles was not merely a question of the sale of an electrically propelled vehicle, but involved questions necessitating a specially trained man, and this, due to lack of co-operation, was not available. Naturally, under these conditions the central station did not actively advocate the use of the electric vehicle, and when they did they lacked the enthusiasm necessary to inspire confidence.

In time, however, the industry itself rebelled against such treatment and a mutual understanding between manufacturers and the central station began to make itself apparent; the Electrical Vehicle Association of America was formed with its purpose, that of aggressively pushing the electric vehicle industry. The benefits of this understanding are well exemplified in the progress made in the electric vehicle industry during the past few years, and due credit should be given to the praiseworthy endeavor of this organization.

The present outlook for the electric vehicle industry far surpasses any of previous record in its promises for the future. The industry has reached a point of good business health, and reports show that the number of orders placed in 1911 were almost 50% greater than those placed in 1910, and also that 80 to 90% of the orders were for additional equipment in existing installations, where the economies and advantages have been sufficient to warrant the entire replacement of the horse equipment.

Every electric vehicle sold is a forerunner of additional machines for the same company, as is evidenced by the magnitude of the older electrical installations which have gradually grown from two or three machines to a dozen or more. There are forty large installations which alone comprise over 2000 vehicles.

According to Stephen G. Thompson it is estimated that 20,000 commercial machines are now in operation; that in a year this will be increased to 45,000, and in 1915 200,000 commercial vehicles will be in use, representing an investment of $500,000,000. These are remarkable figures for an industry that can claim so little time for its inception and growth. Yet the investment of half a billion dollars will seem small in the future, if the electric vehicle for pleasure and commercial purposes reaches the point of application apparently predictable by the rapidly growing demand now exhibited on all sides. As Mr. Thompson states: "If there be any truth in the oft-reiterated statement that the electric vehicle will represent 65% of the total number of commercial machines employed, at the end of 1915 instead of 50,000 electrics and 150,000 gasolene machines, based on the present ratio, there should be 130,000 electrics and 70,000 gasolene; and it is this alone that justifies the central station in actively promoting the introduction of electric vehicles in the same manner in which they have promoted the introduction of other current-consuming devices.

There is one thing which has greatly helped the electric vehicle business during the past few years, and that is the overcoming of the skepticism regarding things electrical, especially the storage battery. Users and prospective users no longer fear that the expense of keeping up the storage battery will force them into bankruptcy. In fact, the storage battery has become almost a household article and is no longer looked upon as a thing of mystery, and something which requires the care of an expert.

I firmly believe the year 1912 will see a most phenomenal advance towards the universal use of the electric vehicle.

And why this prophecy of brilliant achievements this year?

First.—The manufacturers are adhering more to the adage "Profits are legitimate only when they come from SERVICE," and, that in the manufacture and sale of the electric vehicle, SERVICE is the essential aim. It is SERVICE they are manufacturing and selling rather than an electrically propelled vehicle. The manufacturer now backs up his vehicle; I do not mean that he stands back of it for a week, or for a month, or a year, or even for two years, but I mean he vouches for his vehicle to the limit; thus obtaining the confidence of both the public and the central station, which of course results in the permanent success of the manufacturer.

Second.—The public is apparently ready to use some form of power-propelled vehicle for its needs. The advent of the self-propelled vehicle has brought merchandise transfer more closely to the attention of the business executive, and a realization of the inadequate methods of operation under the old regime is forcibly presented each day. Where, a comparatively short time ago, few merchants had any conception of their transportation costs, today the country is flooded with more or less scientific comparisons of horse and motor vehicle operation for the same work performance, and the problem of economic transportation is undergoing an exhaustive study. The question now is not "Will it run?"—They know it will run. "But how many days out of the year will it run?" In other words, "Is it reliable?" What kind of service am I buying? In the point of service the electrical vehicle is paramount to all other types of shorthaul transportation, as it shows less complication and is more easily mastered than any other type. To substantiate this claim for superior service of the electric vehicle, I call to mind the words of President Day Baker of the Electric Vehicle Club of Boston to the effect that in a fleet of trucks in New York City the gasolene cars were in service 174 days out of a possible 310 days, while the electric cars were in duty 298 days out of a possible 310 days. Two men were required to maintain twenty electric cars, while six men were required to maintain six gasolene cars.

The great notable service recorded for the electric vehicle as against the gasolene car was due to the fact that trouble overtakes a gasolene car on the road without warning, while most of the difficulties with the electric cars were due to insufficient battery charging, new drivers, ampere hour meters going wrong, or improper operation by employees. Each gasolene car was out of service an average of three days when taken off the route, while the electric car reappeared without fail in every instance the following morning.

A test of a ten-mile city trip, including no stops, showed that the electric vehicle made the run in twenty minutes less time than that made by the gasolene car—and time at this age represents dollars and cents in loss or profit.

At the last moment of writing I learn of an incident which unquestionably proves the reliability of the electric vehicle to be superior to all. Through the blizzard of Feb. 21st, in Chicago, and in the teeth of a snow-filled gale, blowing 50 miles an hour, the four electric omnibuses operating between the railroad stations and the store of Carson, Pirie, Scott & Co., made their regular schedule unaffected, while hundreds of gasoline automobiles and trucks were overwhelmed by the high wind and deep snow drifts and left abandoned. The electric trucks made fifty round trips on that day, carrying 800 people, the largest number for any day during the four weeks they have been in service. What the electric vehicle can do in Chicago it can do equally as well in New England.

Third.—To precipitate the fulfillment of this prophecy, the last year has shown considerable activity on the part of central stations to promote the electric vehicle industry. This activity is wide spread. Here in New England the Boston Edison Co. is conducting a $100,000 advertising campaign, and still larger plans are under consideration for the future. In line with this advertising campaign it was found necessary to establish an electric vehicle station where the vehicles could receive competent care. This garage has been in operation now about a year and the results are more than gratifying. When they learn that any user of an electric vehicle has not had satisfaction in its operation they ask him to send it to their garage, where it will have an elaborate examination. A report is then made to the operator of the car with suggestions tending toward more efficient running, handling and care. Seldom does the same car develop a repetition of the same troubles. This is a highly commendable scheme, well worthy of adoption by the central station, so that there will be in its territory some place to which electric vehicles can be sent for careful and competent inspection, instead of, as at present, going to the bad on account of no care at all, or on account of ignorant attention.

In Providence, Hartford, New Haven, Springfield, Lowell, Manchester, Portland, Fall River and Worcester the electric vehicle question is receiving enthusiastic attention, and in their sphere they are attempting to approximate the noteworthy example of the Boston Edison Company.

From questions sent out to central stations in New England in an endeavor to learn the development and methods employed in pushing the electric vehicle proposition, the results were far from satisfactory, as only a few replied. It seems apparent that enthusiasm is far below par, and this is one of the most favorable symptoms for failure.

The replies received from but twelve companies show that three are doing nothing at all towards the development of the electric vehicle. The figures from the remaining nine show that they employ eighteen commercial vehicles and one passenger vehicle in their work, and in this total of nineteen vehicles twelve were installed the past year. This is 63% of the total, or 171% increase over the previous record.

In addition to the cars operated by the companies there is at present in service in the territory they serve 86 commercial and 142 passenger vehicles, and of this total of 228 vehicles 105 were installed this past year. This is 46% of the total or 85% increase over the previous record. This is surely commendable and demonstrates the trend towards a universal use of the electric vehicle. These figures do not include cars operated by the Boston Edison Co., nor cars operated in the territory served by them.

Two companies, Lynn Gas & Electric Co., and the Worcester Electric Light Co., maintain public charging stations or garages. Four companies do special advertising and exert special efforts to introduce the electric vehicle. Five companies were very optimistic about the ultimate success of the electric vehicle proposition. Four companies employ a man who is specially trained to deal with electric vehicles and battery problems. These figures show at least one fact, that those who were interested enough to reply to the questions sent out are in the majority of cases taking an enthusiastic interest in this important problem. Let us hope more will become interested at once and assist the good work.

I have heard it stated that companies like the Boston Edison Company are using the vehicle simply because they can afford to do so, and hope thereby to induce others to use this type of vehicle simply to sell their electric current. In other words, simply as a means to an end. This impression is all wrong, and it is the most sacred duty of everyone here to hunt out those holding such views and then to stick with them until their education is started along a more healthy path.

Just how we are going to do this, is the question of many. The answer lies in perfecting an active, energetic co-operation between the central station interest, the vehicle manufacturers and the battery manufacturers. Then to take this co-operation and convert it into an effective sales organization, equipped with the knowledge necessary to study the stable practices, the facilities for loading at the store, the routeing, the load to be carried, and in addition thereto the advantages of the proposed system as compared with the disadvantages of the present system.

The development of the electric vehicle in New England has been somewhat tardy, which is in striking contrast with the rapid growth it has assumed in the middle west. This is due, I believe, to a lack of enthusiasm among us, which must be paramount if we wish to obtain success. We lack enthusiasm, and until we install this enthusiasm into the game and show the public just what the electric vehicle is,—we know what it is,—we know it is going to be a success—until we tell them all we know and in such a manner as to be convincing, just so long do we retard the ultimate success of the electric vehicle proposition. Our enthusiasm should be of that order which tells a man he wants, he needs, he must have an electric vehicle, and then sells it.

As you will probably note from this paper the information about electric vehicles contained therein is most pronounced by its absence, and I freely admit we are new to the electric vehicle proposition, as the company with which I am connected has not as yet had very long experience in this enterprise. However, we have started, we have started right, and we have started with enthusiasm, and the right kind of enthusiasm too.

Last July we started advertising regarding rates, etc., and also that we had completed alterations on one of our buildings which was to be used as an electric vehicle station where we would handle all classes of electric vehicles, doing charging, stabling, repairing, etc. We have competent men in charge and give 24 hour service.

I have simply endeavored to bring to your attention certain essential features which appeared to me vital for the success of this important and vast field for the sale of electric energy.

There are a number of problems which are brought to the electric vehicle representative every day for solution, which have set us all to thinking, and in conclusion I wish to submit some of these questions to be answered, through a general discussion of those present—as follows:—

To what extent is the central station responsible for the introduction of electric vehicles?

What is a fair rate per K.W. hour to be charged for electricity for electric vehicle charging?

What is the most serious drawback to the universal adoption of the electric vehicle?

In what way can the manufacturers most effectively increase the use of electric vehicles?

How can the central stations co-operate in stimulating the sale of electric vehicles?

Are the central stations doing their part in the work of the Electric Vehicle Association of America?

Is there a legitimate demand that central stations take agencies for electric vehicles and maintain public garages?

I most earnestly solicit a hearty discussion of the statements and questions in this paper as it is by this means and this means only that Mr. Edison's statement to a Boston Edison Company official—"In fifteen years more electricity will be sold for electric vehicles than for light"—will ever be realized.

President Sands. In the discussion of this paper, I want to say that we have with us the representatives of a great many electrical vehicle manufacturers, and while we are glad to have them with us, and shall doubtless be glad to hear from them in so far as we can, I take it what is more applicable to the present case, is actual experience of central station men. I have before me a list of some central station men who are operating electrical vehicles and if any others are here, and I don't call upon them, I hope they will let us hear from them any way. I will call upon Mr. Day of the Malden Electric Company.

Mr. Day. I do not know as there is much I can add to Mr. Smith's paper, as it seems to me he has covered the field pretty thoroughly, although I might state what our experience has been in the use of electric vehicles.

We have been experimenting, we might say, with electric vehicles for the past two or three years and have six in operation at the present time. Our first experience was rather sad, as we started in with light pleasure cars and tried to make commercial vehicles of them. However, the figures obtained from that class of service was not altogether discouraging. We have one car that has run some 15,000 miles in commercial service, and has been operated almost three years, doing the work of practically three horses, with a cost of operation of approximately 12c per mile, which I think is very encouraging.

Last June we bought our first up-to-date commercial vehicles which have been in constant use ever since and have given entire satisfaction. What battery troubles we have had have been minor, and so far these cars have run about 6,000 miles, with a cost of operation of approximately 5c. per mile. They are doing the work of two horses; one being operated by three different drivers in the course of 24 hours service, and the other is used all day on one class of work and until midnight on another class. Our experience with these electric vehicles has been very satisfactory, so much so that we have purchased two more which we will put into service immediately and are in hopes of purchasing more in the future.

I wish to bring out one fact in regard to the electric vehicle that Mr. Smith spoke of, and, that is, in regard to what the central station should do. I think it is imperative that the central station have a garage for the maintenance of electric vehicles, and I do not believe we can attempt to do anything until we first do that. Then, there is no question but people will ride in electric vehicles. Everybody is interested in the electric vehicle proposition and I believe the public show as much enthusiasm, or even more, when you get out among them, than we have shown. All we have to do is to tell them we have arrangements so that we can take care of their troubles and they will buy electric vehicles. We have been lame—I know I have—in pushing the electric vehicles. I have been skeptical. Probably the reason was that my first experience was with a gas car. I know I had my troubles there. But I think if we could get together and arrange to take care of the people; go out among them and talk electrics and assure the public they will be protected in the use of electric vehicles; if we do that, I am sure we will have no trouble at all in selling electric vehicles in our territory.

ANSWERING MR. SMITH'S QUESTIONS.

Mr. Frank J. Stone.

First: "To what extent is the central station responsible for the introduction of electric vehicles?"

The central station being a Public Service Corporation it is looked upon by the people as the national source from which to look for its supply of electric power and information on any thing electrical.

No firm would invest in horse equipment unless absolutely certain of being able to obtain oats for the oat motor, including repairs at the blacksmith's or carriage shop.

Second: "What is a fair rate per KW hour to be charged for electricity for electric vehicle charging?"

The rate is dependent largely upon local conditions. It is an "off peak load" and, therefore, offers an opportunity to popularize the use of the electric vehicle. I would refer to the records of proceedings of the last convention of the Electric Vehicle Association of America, showing the rates charged by a number of central stations in many different parts of the country.

Third: "What is the most serious drawback to the universal adoption of the electric vehicle?"

There is no drawback at the present day, if the vehicle is properly applied to meet the requirements and, after its installation, it is properly shod, fed and otherwise cared for.

Fourth: "In what way can the manufacturers most effectively increase the use of electric vehicles?"

By showing the merchant where he can make a sufficient saving in his business by the application of the commercial machine to enable him to indulge in the luxury of a pleasure vehicle. This can best be accomplished through co-operation with the Central Power Station.

Where cities are not of sufficient size at this stage of development of the business to financially justify the manufacturer establishing agencies, then the manufacturer should be in a position to promptly follow up the inquiries received through the work of the central station.

Fifth: "How can the central stations co-operate in stimulating the sale of electric vehicles?"

By advertising and distributing the inquiries received among the electric vehicle manufacturers, stimulating the interest of the manufacturer and public through assurance of efficient service. Some central stations offer free—

Desk Room
Exhibit Room
Electric Signs
Inspection, etc. etc.

Several years ago I published a list showing the current consumption of electric vehicles, as compared to lamps, flat irons, etc. It now seems fitting under this heading to call attention to the amount of money spent by one public service company in exploiting and developing the electric vehicle. The company is meeting with success. It offers an excellent example worthy of a good following.

The population served is approximately,
1,100,000 Approximate expenditures $110,000.
This is at the rate of 10c per capita.

A proportionate expenditure in a city of

200,000	would	be	$20,000.
150,000	"	"	15,000.
100,000	"	"	10,000.
50,000	"	"	5,000.
25,000	"	"	2,500.

The current consumption of 15—2000 lbs. trucks per year on the basis of 5% per KW amounts to approximately $4,500, thus showing a gross profit of 30% on the investment of $15,000.00 in a city of 150,000 population.

Sixth: "Are the central stations doing their part in the work of the Electric Vehicle Association of America?"

Some few central stations are doing noble work in this connection. The vast majority, however, appear blind to the benefits to be derived through the work of the Association.

There are about six thousand central power stations in America, the majority of which should support this work by becoming active members and seeing that members of their own organization become associate members.

The work being done is heavy and rests on a few willing ones. But to carry on the work to the best advantage to all concerned, requires funds the only source of which is through membership fees. Those who cannot assist in the actual work of the association which means development of the business to the advantage of all, I am sure will be willing to contribute their share through membership fees. The amount of work the association accomplishes is necessarily proportional to the funds available.

There are no salaried officers. We cannot at this time afford a permanent Secretary, a much needed officer.

Seventh: "Is there a legitimate demand that central stations take agencies for electric vehicles and maintain public garages?"

Agencies by central stations are to be avoided; while the policy of a company, acting as an agent, might be to remain neutral so as to secure the benefit of the work of the greatest number through competition, yet the carrying out of such a policy is attended with difficulty eventually resulting in lack of co-operation with the manufacturer.

Give the general manager of the manufacturer all possible encouragement, so that he may in turn prevail upon his company to loosen the purse strings of the treasury and, as the members of electric vehicle manufacturers are increasing rapidly, I feel confident the central station will secure in the near future much greater benefit from a neutral policy than otherwise.

Co-operation will more freely open the purse strings of both parties and develop business to the best advantage of all.

The central station should see that a good public garage is established or maintain one of its own; in the former case, the cars should in a measure, come under their supervision.

President Sands. At the convention about two years ago, when we had a paper on electric vehicles, I remember one man in the discussion which followed expressed himself as being very skeptical regarding the operation of the electrical vehicle in his own system. I am going to call upon him today and ask him if he has changed his mind. Mr. Fleet of Portland.

Mr. Fleet. There is no question that some two years ago before the convention I was very skeptical, as Mr. Sands says, and I don't know as I have changed my opinion a great deal up to the present time in some respects. As you all know the city of Portland is a very conservative city. About seven or eight years ago five or six electric vehicles were bought in Portland. They were of the pleasure type, I understand, and they left behind them a very unpleasant feeling and something which the central station man has got to fight out today in order to sell another electric vehicle in Portland. I have thoroughly made up my mind that before I offer to the public of Portland and to my customers another electric vehicle that I will have proof beyond doubt that the electric vehicle is a commercial proposition in the city of Portland. Naturally I started in very easily and in a humble way. I bought one little truck with a great deal of opposition from my directors and put it to work. The results obtained from the operation of the truck were very satisfactory. The one small truck replaced two horses and did the work more quickly and at a lower cost. Everything went along booming. In fact the directors of my company began to believe the electric truck was the right thing in Portland for our work. I had hopes. Now mind you, I don't want anybody to believe that I don't think the electric truck is the right thing if we get the bugs picked out of it, because I do. It is a means by which we can sell kilowatt hours and our off-peak load. We all want to raise that valley if we can. I had hopes that the electric vehicle was going to come into Portland in pretty good shape. Everything went along swimmingly until the deep snow came. Last winter was a good winter to try it out. We had snow a-plenty. I am very sorry to say I had to put my little truck up for nearly three months. Naturally all the good work I had done with my directors—mind you I haven't done anything with the public yet, but have been trying to convince myself and the directors that the electric vehicle was the proper thing—all the good work I had done with my directors had all gone for nothing. Now I have to convince them all over again. The trouble with my truck was that I could not get through the deep snow with it. In my gas cars, of which I have three, there was comparatively little trouble. They were tied up for a little over three weeks, while the electric was tied up for almost three months. Now I don't believe that is something that is going to prevent the electric truck from making good in the city of Portland. But it is a condition that has crept into the manufacture of the truck, and I haven't as yet, although I have written the manufacturers, had any of them come down to show me how to get over that difficulty, how to climb over the deep snow, and the consequence is I have lost an entire year of the business of the electric truck. About three months ago I notified some five or six—I think it was five if I remember rightly—of the electric truck manufacturers of a coal company that proposed putting in two additional large trucks in the city of Portland for hauling coal. I haven't seen any of those manufacturers around to get that business. I stood ready to make a very favorable rate in power for an off-peak load to charge the truck with, but nothing has been done by the manufacturers up to the present time to get that business. In other words they have left it entirely to me. And I want to tell the manufacturers represented here today that the State of Maine is watching the city of Portland to see whether it is possible to handle electric trucks in Portland as a commercial proposition. I think a great deal might be done by the manufacturers bringing to Portland in the winter time one of their large trucks, loading it up with coal, and going out and chasing after some of the numerous gas cars which go up by my office every day loaded up with 5 or 6 tons of coal, hiking out into the country 5 or 6 miles. These gas trucks went through all snow every day last winter when teams could not do anything, and it speaks a good deal for the gas truck. I am up against that proposition. When people ask me regarding my electric truck, why I haven't got it out, what am I going to tell them? That the snow is too deep? I am not going to bluff them. When I come out with a statement it is going to be the truth, whatever it may be. Now I personally have a sore grievance against the manufacturers, because I believe they are not helping the central station men. At least that is my experience. I don't want to be termed a kicker, but I want to cite these things as they come up, and if the manufacturers of electric vehicles intend to sell anything in the way of a vehicle in the city of Portland, they want to come down and demonstrate it and not be afraid to come down and demonstrate it. So far I have not had my truck corrected. Today it is out doing business because the snow has disappeared. But I believe I have been set back a whole year because that one measley little truck I have would not run in deep snow. Probably most of you would not agree with me that I am not a kicker, you all term me a kicker. Well, I believe I have just cause to kick and when there is cause to kick, I am going to kick, because I want the business of charging the electric trucks in the city of Portland. It is a purely selfish stand, but I want to increase my peak load, and I see a possibility of increasing that peak load if I can get the right apparatus to perform that work in that state.

President Sands. Mr. Smith in his paper referred to the prevalent idea that the general adoption of electric vehicles by the Edison Company of Boston was not made for reasons of economy but rather for reasons of jealousy. I happen, personally, to know that is not true. A great many of you in the room know that is not true. They adopted the electric vehicle as a commercial proposition. They even went further than that and have been conducting at the Institute of Technology a very exhaustive series of tests, and it is our good fortune through the courtesy of the Edison Company and through the kindness of Mr. Thomson of the Institute to learn something of that work. Mr. Thomson.

MR. THOMSON. On page 6, Mr. Smith speaks of the first reason for his brilliant prophecy as based upon the fact that manufacturers now realize that they must sell *service* and not an electric vehicle. His statement, "Service is the essential aim" implies volumes. This is the great point towards which all of the large truck manufacturers are working. As one representative has deftly stated the case, "The aim is not to sell a truck but to keep it sold."

One might say that the manufacturers' duty in rendering service is to quickly supply the worn-out parts. A still more important feature of the problem of attaining satisfactory results is that of the adaptability of the vehicle to its work; that is, the class of service must be closely studied. It seems a simple matter to decide upon the weight of a horse which is needed for a certain duty, but if a plant were to be equipped with machines an extended analysis would be necessary. It is just so with vehicles. The essential point is that of fitting the wagon to its class of service. An example is a large department store which maintains different numbers of deliveries in different zones of its free delivery area. In such a case many types of vehicles would be needed to give satisfactory results in each zone.

One function of the study being made by the Institute of Technology of the operation of electric vehicles is to provide such information as will aid in deciding upon the several types of vehicles for such an installation. This information should be like that which a power solicitor presents when he solicits an isolated plant to use station energy. We do not hope to give the diversity of data which are now to be had on textile or paper mills, but we expect to make a valuable start in this direction. Both central stations and manufacturers can greatly aid through informing us of the whereabouts of reliable data.

To obtain this specific kind of information on the operation of vehicles we have arranged with nine Boston firms to supply us with daily reports of the work done by certain of their wagons. Three of these are maintaining on the wagons distance registers which give tapes daily of the movements of the vehicles. We have installed similar registers on wagons belonging to the other six companies. The services thus represented include city pick-up, furniture moving, freight handling, freight forwarding, baggage call and delivery, wholesale and retail coal delivery, parcel delivery, miscellaneous hauling, bottled goods delivery, central station installation, maintenance and transportation services. The vehicles represented are almost as numerous as the classes of work and include one, two and three horse wagons, electric trucks from 700 to 10,000 lbs. and gasolene trucks from 1000 to 6000 lbs. ratings. The tapes are collected at night and are received by the various wagon owners the following morning. Any information which they desire to record is noted and the tapes are forwarded to the Institute. Here they are analyzed and filed for reference. Reports are also obtained on the work done by the wagons each day and also on the total expense of operating the vehicles.

Specimen averages over a recent two weeks period are noted following:

Vehicle Service	1000 lb. El. Parcel del.	4000 lb. El. Miscl. haul.	8000 lb. Gas. Baggage trans.	6000 lb. Gas. Miscl. Frt. handling	1 horse wagon City pickup	2 horse caravan Mfger's. Frt. delivery
Miles per day	30.1	14.7	45.7	13.9	18.9	13.0
Hours used per day	9.8	8.4	11.6	9.1	10.9	10.8
Hours moving per day	3.2	2.4	4.0	2.2	4.1	3.7
Hours stand'g per day	6.6	6.0	7.6	6.9	6.8	7.1
Av. run sp. th'gh't day	9.3	6.2	11.5	6.8	4.6	3.5
Av. run sp. on long runs	9.6	6.5	14.8	7.6	5.2	3.6

It will thus be noted that in many cases the wagons are standing still several times the number of hours during the day that they are moving. This is uneconomical whether horses or motors are being used, but much more so in the latter case. As an example of the necessity of reducing the standing time let us replace a horse wagon moving only 30% of the day, which is not extremely low, by an electric with double the average horse wagon speed. Thus the motor would save one-half of the 30% running time or 15% in the day's work. An increase of only 15% work per vehicle does not warrant the change from horse to electric power. A motor truck can be operated with economy at a speed from two to four times that of a horse truck and unless the standing time for loading and unloading is cut down in the same proportion the full advantage of this increased speed cannot be realized. Thus in installing machines there are two problems; first, to get the machine which is capable of doing the work best; and second, to arrange its operating conditions so as to make it do the work economically.

I am interested in the statement in the paper that the country is flooded with comparisons of horse and motor operation, but I am convinced that little is really available which is authentic and usable. One feature of our research is the collection of expense figures from all over the country. Standard forms have been drawn up for tabulating the reports from the various sources. We are not now able to quote any figures but some will undoubtedly be put in print within the very near future. One tabulation we have made of a two-horse wagon with a two-ton electric truck shows that the cost, including driver and overhead, was less for the horse wagon when running less than 13 miles per day, which is approximately the distance being covered by many freight teams. But even in such a case it should be realized that an electric substituted in this work could be made to cover 25 miles per day by diminishing the excessive amount of time during which horse wagons are at present standing idle. In this tabulation, for distances between 13 and 20 miles per day the costs were practically the same for horse or electric trucks; for distances above 20 miles duplicate horse equipments must be used and here the motor costs are approximately two-thirds of the horse.

This only goes to emphasize what I have mentioned above, namely that the electric truck possesses immense advantages when used so that it will cover the distances of which it is capable. It may be necessary in order to realize their full advantage to make considerable changes in the methods previously employed in the service using horse drawn vehicles only. Our study of the conditions at the Boston railroad terminals has indicated that at them the waiting time is not sufficiently great to seriously affect the use of motors. As this is the only situation where the conditions cannot be controlled by the vehicle owner or user, it would not seem to be difficult to arrange the loading and unloading facilities elsewhere so as to afford the electric the advantage of its higher speed, and thus eclipse our "faithful dobbin."

PRESIDENT SANDS. Referring to Mr. Fleet's remarks regarding the inability to operate in winter time, I have in mind one and possibly two electric vehicles that are in operation not more than twenty miles from Portland, and I wonder if Mr. Day Baker is in the room and if he can tell us something about the operation of those vehicles.

MR. DAY BAKER. I should like to say in regard to vehicles operating in Northern New England that we have two or three in operation by the Pepperell Manufacturing Company of Biddeford, Maine. These were on the road during the past winter without the loss of a single day. I will say that usually during the first six months that a man has an electric vehicle he sometimes finds troubles which disappear as he becomes acquainted with the possibilities of the vehicle.

I will say that I received one single letter from the last speaker, saying that when his machine crossed the railroad tracks, the battery box had a tendency to strike the snow. The manufacturers of the electric truck Mr. Fleet is operating did not know, and have not known that the vehicle was off the street. Had Mr. Fleet advised them that the machine was off the streets they would have sent a man to look after the trouble, and put it on the street immediately. We had the same difficulty with a Biddeford party. He said the machines were not able to operate in the snow. We sent an engineer. He found the trouble, applied the remedy and put the machines in operation. The men said they did not think it was safe to operate the machines in the snow. They did not have any chains on the wheels. We got chains on rear wheels, and for the last two winters there has been no trouble in operating in the snow.

The most northern point in this country where electric vehicles are operated it at Montreal. There the Canadian Consolidated Rubber Company have in constant operation a two-ton truck, which is run all winter despite the fact that there is frequently twenty-four inches of snow on the ground. I understand that this vehicle was off the road two days during this last winter, but on these two days a blizzard was raging; the electric cars were stopped and practically all street traffic. The owners of the truck stated that they believed that they could have operated it during these two days, but as business was practically at a standstill there was no necessity to send the machines on the road.

I might say that the Amoskeag Manufacturing Company at Manchester, N. H., is operating seven electric machines. The Pacific Mills at Lawrence, Mass., have a large fleet, while a number are in use in Watertown, N. Y., and Plattsburgh, N. Y. All of these localities are subject to as heavy snows as Portland, Maine, and yet none of these vehicles has lost any time from the road during the winter season. The machines at Manchester have been operating for a number of years, and we have in our possession a most excellent letter from the Pacific Mills at Lawrence, in which they state that they have never lost a single hour on account of snow, except the time required to apply the chains to the rear wheels.

I don't know of any vehicle or vehicles except Mr. Fleet's that have been taken off the street during the past winter and we have had a hard winter, very deep snow and some of the snow of the sticky kind that is had to push a vehicle through. Mr. Fleet's is the sole instance we have had reported where a vehicle was actually taken off the road.

There are a number of things I wanted to say, but I am going to be brief because there are other speakers, and one who, I am sure, is going to be intensely interesting. Regarding the increase in the Electric Vehicle out-put, the company with which I am connected, increased its sales last year over the previous year approximately 100%, and 70% of that business was repeat orders; that is, orders received from people who had purchased one or more machines and as a result purchased others. The investment in electric vehicles in the United States at the present time is $30,000,000 in pleasure vehicles, and $10,000,000 in commercial vehicles. During 1911 $10,000,000 worth of pleasure vehicles and $2,500,000 worth of trucks were sold, an increase for the year of 31%. One electric vehicle manufacturing company has 1,009 trucks operated by 70 customers, showing there must be many people who like the electric trucks and keep on operating them. Two express companies are operating 356 vehicles, and three breweries are operating 173; three bakeries, 119; and three central stations 158. Many of these installation are from six to eleven years old. The electric vehicle has been a little slow in its introduction in New England, due to the fact that New Englanders are conservatives and want to be shown. Many central stations have not worked with the vehicle manufacturer, and I know of one central station which kept the price up on current to a prohibitive figure. Finally they were convinced that the electric was a desirable vehicle and reduced the price of the current. But the fact that for years they said that the electric vehicle was not good still remains in the minds of merchants. They remember that, and they don't know that the central station has changed its position. The manufacturers are all trying to work with the central stations, and you will find the prices on electric vehicles and batteries are being reduced, while the guarantees on almost everything in the electric vehicles and the batteries are being increased. I think the central station should help the vehicle manufacturers to sell the vehicles and that will help to increase the volume of their sales on the off-peak periods, which will tend to increase the dividends.

The central stations will get great returns from helping the vehicle manufacturers. I believe all the central station managers should go back to their respective cities, talk with their water boards, street commissioners, and park and fire departments, and urge them to use electric vehicles for municipal purposes. The electric vehicle has proved a great success on account of the simplicity and economy with which it can be operated, and because it is constructed along extremely practicable lines. I believe that the use of the electric vehicle, and in fact all kinds of automobiles, is going to increase very fast. The candle is much inferior to the electric light. It costs less to burn candles than it does to burn electric lights, but we use the electric lights. It costs less to climb stairs than to run an elevator; but we take the elevator every time. It costs less to take a walk than to take a cab, but we take the convenient way. And so, I say, when the convenience of the Electric Vehicles becomes generally known they will be bought for pleasure and business, regardless of economy. People like to ride by electricity. Electricity for all uses is popular, and if the central stations will do their share toward helping the vehicle manufacturer popularize it further, I am sure we will have plenty of electric vehicles in use all through the New England states, and the off-peak load of the central station will be one of great profit.

President Sands. We have an organization which has undertaken to exploit the electric vehicle industry in this country. The purpose of this paper was not in any way to supplant the work they are doing, but to aid and assist that work. The president of that organization is with us and if he has recovered his voice, I know you will all be glad to hear from Mr. Blood.

Mr. Blood. The Electric Vehicle Association of America has been described as a live organization. It is. It is a very live organization. This is due to the work of all the officers, the committees and the members of the association. The Association now has a membership larger than the National Electric Light Association had after it had been going for twelve years, and yet the Electric Vehicle Association was started less than two years ago. Its headquarters are in New York, because it is a national organization. The monthly meetings are held in New York and they are interesting and very profitable. The proceedings of the association are published monthly in the central station, the official organ of the association. There has been established, as you know, in Boston a New England branch and just now another is being started in Chicago and the movement is going over the country. I said that the Electric Vehicle Association of America is a live organization. I believe it is. We are attempting among other things (as you have probably heard through statements that I have made and through circulars which we have sent out), to raise a large fund to popularize the use of electric vehicles. We started out to get $50,000 and we have raised nearly the full amount, and at the meeting of the Board of Directors next Tuesday we shall probably set in motion the advertising campaign and arrange most of the details. This campaign is for the purpose of popularizing the use of electric vehicles regardless of make or of kind of battery or of anything else. We shall attempt to tell the American public that the electric truck is a commercial proposition and that the electric pleasure car is "A thing of beauty and a joy forever."

The fact that this organization is a live one is illustrated by the following statement: After one of the meetings in New York the other night, with a number of gentlemen I went over to the Engineers' Club, where we sat around for a few minutes. One of the gentlemen—and by the way he is a representative of the largest concern manufacturing motors for electric vehicles—said to me,—"Blood! you are raising the devil with the electric vehicle business." I said, "What do you mean? I am surprised to hear you make such a statement." He said, "We don't know how to handle the business that is coming to us. The advertising you are already giving the business is having a wonderful effect. Last year was the biggest year we ever had in the manufacture of motors for electric vehicles. We have done 80% as much business so far this year in two months as we did the whole of the year previous." Another gentleman sitting on my right said "I can make a similar statement, only perhaps a little stronger; the figures for the month of January for my company this year were 242% larger than the business we did in the corresponding month a year ago and that was the largest month in our history up to that time." This advertising is making everybody sit up and take notice. I am very glad to see the response from the central stations in subscribing to this publicity campaign. It is most pleasing. Some of the electric vehicle manufacturing companies have not been able to subscribe as liberally as they would like, for the simple reason that they are new organizations and are not very well equipped financially. They are trying to do a big business with a small capital, and I think they should have great credit for what they are trying to do. The sinews of war are not yet developed. This is a young business and the companies which are going into it have not yet placed themselves upon as firm a foundation financially as have the gasolene manufacturers. But in this connection I am glad to note that many of the gasolene manufacturers are taking up the building of electric cars because they recognize that it is a field they must cover—the manufacture of electric trucks.

Now the central stations I think are in a peculiar position. We have criticized the vehicle manufacturers a good deal in the past and I am among those who made a good deal of talk along that line. I think the tide is turning; I think the vehicle manufacturers are doing all that they can. If they were to put a representative into every city in the country, it would be more than they could swing. If they were asked to put a truck or a pleasure car on exhibition in every central station, it would be asking altogether too much. They could not possibly do it. The central station has got to do its part.

Many of them are doing their part, some of them are doing more than should be expected of them.

Now one word further. The central station must be neutral. I believe this is absolutely essential. If the central station attempts to advertise this particular truck or that particular battery, it will be accused of having ulterior motives, whether it has or not. You may find isolated cases where it is necessary, but in the large majority of instances the central station must, I think, maintain a neutral position. It is bound to act as a sort of a clearing house. The prospective user will come to the central station to ask what it will advise. It should give the names of the reliable manufacturers of electric vehicles and batteries and let the customer decide for himself what to buy. Don't tell him that "there is only one good car" or say to him "don't use so and so's car for if you do I won't furnish current for it," as I have heard has been done. I believe such a procedure is all wrong. The central station is in the position of the common carrier, we can't discriminate. We should be ready to charge a battery no matter what it is or what kind of a truck or vehicle it is in. I think the central station should work on the theory of the man who says "all whiskey is good, maybe some is better than others, but all is good." Unless you take this neutral position, there is a possibility that you may get a stab in the back. I don't think you are liable to, but it is very easy for the truck agent who is making an installation in this brewery or that department store where a number of trucks are going in to say to his client, "I believe I wouldn't take central station current, you had best put in an isolated plant." That has been done, but if you get together and boost the game of co-operation you will never have any back fire of that kind. So I urge absolute neutrality in this business.

President Sands. Those of you who attended the Motor Show in Boston recently were doubtless interested in the various pieces of fire apparatus displayed there. I don't think any of you noticed any piece of electrical apparatus. This city of Springfield has taken the lead in this matter and has today a remarkable equipment of electrical machines devoted to fire department uses. Mr. Daggett chief of the Fire Department has very kindly consented to come here and tell us of the electric apparatus he has in use.

Mr. Daggett. I lack technical knowledge of electrical matters and for that reason shall confine my remarks to a brief account of the manner in which the Springfield Fire Department came to adopt electrically propelled fire apparatus and a statement of the service that apparatus has given.

The Springfield Department was really forced to the use of electric apparatus. It happened this way. About five and a half years ago the Board of Fire Commissioners of this city became interested in the subject of motor fire apparatus and finally ventured to install one piece. The result was very satisfactory. Six months later the Commissioners purchased two more pieces and within a short time a fourth piece was put into operation. At that time the Commissioners formed the plan of having one station equipped with nothing but motor apparatus. The Chestnut St. station was selected for the purpose; stables and loft were torn out and some of the additional space thus gained converted into sleeping rooms. A motor-driven combination Hose and Chemical and a Squad car were installed in the remodeled building.

Soon after this action the much talked of project of the erection of Springfield's splendid group of Municipal Buildings was brought to a head. To make way for the new structures the city was obliged to build new Fire and Police Headquarters and our Fire Commissioners, convinced of the advantages of motor over horse-drawn apparatus, decided to make the new Headquarters building, like the remodelled Chestnut St. Station, a horseless house.

Casting about for the necessary motor apparatus with which to equip the new building we found that up to that time, with the exception of a gasolene-tractor drawn ladder at Vancouver, B. C., no motor-propelled Aerial Ladder had been constructed. It was at this stage of our investigations that we came into possession of facts regarding electrically propelled fire apparatus in use in some European countries. We could find nothing of the kind in this country but we found some commercial vehicles, electrically propelled, that were giving satisfaction and were of a type easily convertible to our needs. Some of these were found in use, by members of our Fire Commission, in a little town seventeen or eighteen miles north of here and inquiries brought out the fact that they were giving complete satisfaction. One was in the care of boys and we came to the conclusion that if they could run a car of that type, we might.

Just about that time Mr. Ira Miller dropped in at Fire Headquarters to talk electric vehicles and our opportunity came. Well, the result of it was that we entered into a contract with the Seagrave Co. of Columbus, O. to design and build a ladder; the Couple-Gear Freight-Wheel Co. of Grand Rapids, Mich. to furnish the wheels. They were something like a year building that piece of apparatus and it was delivered here a year ago last December. It was equipped with the National batteries, purchased of the United Light and Heating Co. That Ladder Truck was put into service a year ago this month. The batteries, which were also used for experimental purposes during the period of construction, will be two years old in June. So far, though the Truck has not been out of service one moment since we have owned it, it has never "skipped" or given a single sign of hesitation at starting or in operation.

Having installed this Truck and the paraphernalia for charging it we came to the conclusion that we should have an electrically propelled Hose Wagon. We had the chassis for this piece of apparatus built and shipped to use by the Seagraves people and had the body built here, from a design of our own. This Wagon has been running since a year ago and has not failed once.

The three-horse Ladder Truck we had in service at the old headquarters was useless in our building. We decided to convert it into a motor-propelled machine and purchase an electric Tractor. Taking away the front wheels, poles, seat, etc. the Tractor was placed where the three horses had been, converting the whole into a symmetrical and satisfactory piece of electric apparatus, as you will see a little later.

As to the speed of our electric apparatus; the Ladder Truck, the first electric piece we purchased, was found, in a test through Main St., to have a speed of 23.43 miles per hour. During this test however a street car was stopped in such a position as to frighten the driver and he slowed down. I am confident, had this not happened, that the machine would have done 25 miles per hour. The Tractor that I have referred to as replacing the horses on the three-horse Ladder Truck, running over the same course, developed a speed of 27 miles per hour. The Hose Wagon has a speed of about 30 miles per hour.

We have now another piece of electrically propelled apparatus, recently delivered. In addition, another electric Ladder Truck is in process of construction for us, by the Seagraves Company. This will probably be delivered within eight or ten weeks, making a total of five pieces of electrically propelled fire apparatus in the Springfield Department.

Now gentlemen, if you have a few moments I will telephone for our electrical apparatus and you may look the pieces over at your pleasure.

EVENING SESSION, FRIDAY, MARCH 22.

PRESIDENT SANDS. Mr. Wallis will present the report of the Rate Committee.

REPORT OF THE RATE COMMITTEE OF THE NEW ENGLAND SECTION OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION

SPRINGFIELD, MASS., MARCH 21-22, 1912.

Your Committee has had several meetings during the past year, and has carefully considered the Rate question with all of its complications. It felt that in view of the pending action of Public Service Commissions in several of the N. E.

States, requiring that all regular and special rates be reported, thus becoming a matter of record, that this would have a tendency to eliminate existing special rates, and the practice of making special rates would naturally be discontinued; thus, the situation would be greatly clarified and become much less of a problem to consider at an early future date than during the present year.

The Committee, therefore, concluded it would be unwise to attempt to analyze the commercial rates of the many member companies with the idea of suggesting a uniform method to adopt at the present time.

Your Committee would recommend that all existing special rates be changed to regular rates as rapidly as is consistent with the terms of present agreements, and further recommends that a published schedule be the basis of all future business.

Your Committee decided, however, that if it could succeed in laying before you in a practical manner a formulæ for a uniform method for charging for street lighting, that would result in making it possible to quote the various municipalities with whom you deal, a schedule of rates for street lighting that would automatically adjust itself to the differing conditions of service as between two or more municipalities, or even with a single municipality, such as regularly obtains in practice, viz.:—Moonlight till midnight, moonlight till one o'clock, moonlight all night, every night until midnight, every night until one o'clock, every night all night, early morning lighting for mill operatives, and milk men's circuits, special service when fire alarms are sounded and streets are not lighted, dark and stormy nights on moon schedule, etc., that it would be doing the members of the Association a real service, and with this end in view it has secured all possible data.

The Boston Edison Co., it found, had several years ago adopted such a rate system, which is as follows:

A fixed cost charge per lamp per year.

A running cost charge per lamp per hour.

A discount for each year for which the contract is to run after the first year.

Its rate schedule is as follows:

STREET LIGHTING RATES.

Electricity for street lighting use will be sold to Municipalities under the Street Lighting Terms and Conditions printed herewith, in accordance with the following table:

	Description of lamp				Fixed Costs per lamp per year	Running costs per lamp hour	
	40 c.p.	Inc.		lamp	$10.80	25/100	cent
	60 "	"		"	12.00	3/10	"
	80 "	"		"	14.00	4/10	"
	100 "	"		"	18.00	5/10	"
	200 "	"		"	25.00	1	"
	320 "	"		"	36.00	1 5/10	cents
	400 "	"		"	42.00	1 6/10	"
	425 watt	A.C.	Arc.	"	36.00	1 5/10	"
400 c.p. Gilbert	500 "	D.C.	"	"	36.00	1 6/10	"
800 " Magnetite	500 "	D.C.	"	"	42.00	1 75/100	"
1600 " Thoran	500 "	D.C.	"	"	42.00	3 2/10	"

All readings of candle power and watts to be average and not individual.

First Deduction. A rate of 1c per hour per incandescent lamp and 5c per hour per arc lamp will be allowed for all outages in any month, provided written notice of same is received by the company on or before the 5th of the succeeding month.

Second Deduction. When agreements are made for periods longer than one year, a discount of one per cent per year will be allowed for each year up to ten.

Commercial customers may purchase electricity for street lighting purposes by signing the appropriate agreement and paying prices in accordance with Schedule E.

STREET LIGHTING TERMS AND CONDITIONS.

1. The lamps, poles, wires, fixtures and other apparatus, appliances and materials necessary for the performance of

this Agreement, except posts for incandescent lamps supplied from underground circuits, shall be furnished by the Company and kept in good order and condition by it. The lamps shall give a clear and steady light. The Company shall furnish electrodes (carbons) for and trim all arc lamps, and will renew incandescent lamps whenever they become dim, broken or burned out.

2. Payments hereunder shall be made monthly on the regular pay day of the Municipality.

3. The Company will give the Municipality the benefit of any lower prices for service such as that herein provided for, or of any better quality or efficiency of service, which may at any time during the continuance of this Agreement be enjoyed by any Municipality served by it, such relative prices, quality and efficiency to be determined by taking into consideration all the circumstances and conditions in both cases. Upon written demand by the Municipality the Company shall thereafter give to the Municipality the benefit of two-thirds of any general reduction in the present cost to the Company, including depreciation and interest on investment, of supplying the service called for by this Agreement, but only so long as and to the extent that such decreased cost shall continue. If at any time during the continuance of this Agreement the Company and the Municipality shall disagree upon any matter embraced in this term and condition, it shall be referred to the arbitration of three disinterested persons, selected one by the Municipality, one by the Company, and the third by the other two, a decision of a majority of whom shall be binding upon the parties, provided the constitutional rights of either party shall not thereby be infringed.

4. The Company will indemnify and save harmless the Municipality against any and all claims for damages, loss, cost and expense on account of injury to persons or property arising in any way out of the erection, construction, maintenance or use of any of the lamps, poles, wires, fixtures and other apparatus and appliances furnished by the Company hereunder, except where such injury is the result, in whole or in part, of the fault or neglect of the Municipality, its officers,

servants or agents, while acting as agents of the Municipality; and against any and all claims for damages by reason of any alleged infringement of patent rights in the use of lamps, poles, wires, fixtures, machinery and other apparatus, appliances and material supplied by the Company hereunder; and will, at its own expense, assume the defence of all actions at law or in equity which may be brought against the Municipality upon any claims as aforesaid, and also against all decrees, judgments and orders of any court based thereon.

5. The Municipality may at all times, with or without the Company's knowledge, employ a competent person to examine and test the electrical currents and apparatus employed in furnishing the lighting service herein provided for, to ascertain whether or not the Company is complying with the terms of this Agreement, and for such purpose the Company agrees that such person may have access at all reasonable times to said lamps, poles, wires fixtures and other apparatus of the Company used in carrying out this Agreement.

The Municipality will indemnify and save harmless the Company against any and all claims for damages, loss, cost and expense on account of injury to persons or property arising in any way out of the employment, act or neglect of any such person, except such as may arise, in whole or in part, from the fault or neglect of the Company, its agents or servants, while acting as agents of the Company.

In case two tests of any circuit or lamp shall be made, separated by an interval of not less than one hour, during any one night, and both of said tests shall prove that the Company is not furnishing the electrical energy or light required by this Agreement, then such circuit or such lamp shall be deemed to be outages as provided herein.

6. Such additional lamps shall be installed, without charge to the Municipality, as may be designated by the Municipality at any time before notice is given to terminate this Agreement, provided the Company shall not be required to extend its lines more than four hundred feet overhead, or in localities served by underground construction more than one hundred feet underground, to reach any lamp; but the Municipality

may require extension of lines for additional lamps at any time during the term of this Agreement, by paying the cost of so much of the extension as exceeds that herein required to be made by the Company, such payments to apply as credits on future bills for lighting on such additional lines. Whenever requested by the Municipality, the Company will change the location of any lamps at the expense of the Municipality, not exceeding, however, five dollars for each arc lamp and three dollars for each incandescent lamp so moved, unless new lines or poles are required.

7. The discontinuance of any street or highway shall have the effect of discontinuing whatever lamps may have been located on such street or way. The Municipality may at any time discontinue a lamp or lamps for reasonable cause, but the number of lamps of any type in service at any time shall not, except as herein-below provided, be less than ninety-five per cent of the maximum number of such lamps in service under this Agreement at any time prior thereto. In case of such discontinuances the installation of any lamps at other locations shall be charged for the same as changes of locations under Article 6 hereof until the original number installed shall again have been reached. Lamps of any type may be substituted for lamps of any other type if the Municipality pays the total expense of making the change and the total amount of payments by the Municipality hereunder at the then standard rates is not thereby diminished.

8. Should the Municipality at any time find that the Company is not complying fully with the terms and requirements of this Agreement, the Municipality shall immediately notify the Company of such fact, and the Company shall at once remedy the fault, but failure to give such notice shall not impair any obligation of the Company. But the Company shall not be responsible for any failure to supply electricity if such failure is without default or neglect on its part.

9. If the Municipality shall at any time during the continuance of this Agreement be required to purchase the whole or any part of the plant of the Company located within the limits of said Municipality, under the present law, or any

amendment thereof, the Municipality shall not be holden for the unexpired term of this Agreement, nor shall this Agreement or the unexpired term thereof be in any way considered as an element of value in such purchase; provided, however, that in case of such purchase the Municipality shall not be entitled to the full discount provided for in this Agreement unless it shall have been in operation for the full period thereof. If the Agreement shall not have been in operation for the full period thereof, because of such purchase, the accounts between the Municipality and the Company shall be adjusted so as to make the total net payments by the Municipality to the Company what they would have been if the Agreement had been made for the period during which it was actually in operation.

The Boston Edison Co. furnishes 35 towns and cities with street lighting service all of which are supplied under the foregoing schedule; of this number, three are one year contracts; two are on five year contracts and 30 are on 10 year contracts.

Nothing your Committee could say endorsing such a rate system could be as effective as the above actual results. Moreover, it has been able to extend its street lighting service with six Municipalities, as follows:

In one town from 12.30 moonlight to 1 o'clock every night; in another from 12.30 moonlight to all night moonlight; in another from 12.30 every night to all night; in another from 1 o'clock moonlight to 1 o'clock full service; in one city from 12.30 o'clock moonlight to all night full service; and in another city from 1 o'clock full service to all night full service.

It is directly due to the discount feature that long term contracts have been so generally secured. Several of the larger Companies in Massachusetts have already adapted this rate system to their conditions.

Your committee does not suggest that any particular fixed rate shall be adopted, such a suggestion could not be put into practice. It does, however, recommend to the member companies of this New England Section of the N. E. L. A. that they adopt such a rate system for street lighting service, namely:

A fixed charge per lamp per year.

An operating charge per lamp per hour.

A discount for each year for which the contract is to run.

The Committee believes that a flat rate charge of so many dollars per lamp per year is responsible for much of the difficulty which accompanies the making or renewing of street lighting agreements with the public authorities, and that it is almost impossible to satisfy the officials of one community that a higher price per lamp per year than that of another municipality served by the same Company, is justifiable because, for example, their hours of service may be every night until midnight instead of moonlight until midnight.

Upon such a system your Committee has figured the street lighting service of all of the companies who have reported their data in sufficient detail to enable them to do so.

These are appended to this report and while it does not appear as desirable to read this list, if any representative of any of the companies included desires to learn how such affects his existing charge it is only necessary for him to express his desire.

ABEL REYNOLDS, Chairman.
L. R. WALLIS,
C. A. LEARNED,
GEO. S. HALEY,
W. G. MELOON,
W. B. BRAGDON.

Committee on Rates.

PRESIDENT SANDS. The report is before you, gentlemen; what action will you take?

MR. SMITH. Inasmuch as no printed report could be obtained for this meeting, I move that it be accepted and referred to the executive committee for their consideration and action. (Motion adopted).

It was voted to change Article VI, Section 1 of the Constitution to read "The annual meeting shall be held prior to November 1 of each year and in such place and on such date as the Executive Committee may determine," instead of "prior to April 1 of each year" as it now reads; also change Article V, Section 2 to read "from November 1st" instead of "from April 1st"; also Article V, Section 3 "from November 1st" instead of "from April 1st" as they now read.

The nominating committee made the following report:

For President, J. S. Whitaker, Portsmouth, N. H.; Vice-President, A. B. Lisle, Providence, R. I.; Treasurer, W. E. Holmes, Cambridge, Mass.; Executive Committee, L. D. Gibbs, Boston; George F. Haley, Rutland, Vt.; L. J. Chase, Concord, N. H.; F. D. Adams, New Haven, Ct.; A. F. Townsend, Woonsocket, R. I.; J. A. Fleet, Portland, Me.

Mr. Rowell. In making this report your committee feels sorry to have to leave off the executive committee a member who has been extremely efficient, but Mr. Rollins having moved into a different state, we were obliged, under the by-laws, to select another man from Connecticut.

On motion, the treasurer was instructed to cast one ballot for the officers named and they were declared elected.

President Sands. I present to you the president-elect, Mr. Whitaker.

President-elect Whitaker. Gentlemen: I thank you for this honor, but I am not going to inflict any speech upon you.

President Sands. One does not have to be blessed with years to be able to remember the time when the total membership of the National Electric Light Association was very much less than the present membership of the New England Section. And by the same token it is not necessary to hark back very many years to remember the time when the duties imposed upon the office of President of the National Association were far from onerous. That, however, has been changed within the last few years. The National Electric Light Association today has a membership of approximately 11,000 members representing an investment of upwards of $2,000,000,000. What this means to the man who is chosen to guide the affairs of the association can best be told by him who has to do it. But it can be safely said that whoever accepts the office of president of the national association must make up his mind that he is going to do very little else during the term of his office. I think this is indicative and characteristic of the spirit of the National Electric Light Association, that each year we are able to find men of large affairs, men of ability, who are willing to devote their time and their energy to this work without any compensation whatever. The present incumbent is no exception to the rule, except that he has set a new mark. In almost every issue of our technical papers we have read of him in this or that part of the country pushing the work of the Association and the interests connected with the Association's work. And that we are enabled to have him with us tonight is indeed a fortunate circumstance. I take pleasure in presenting President Gilchrist of the National Electric Light Association.

PRESIDENT GILCHRIST. Mr. President and gentlemen of the New England Section: Your president has referred to the fact that you read in the bulletins and printed matter of the various branches of the National Association that the president is more or less active in spots. I have many times wished the writers for the various bulletins were not quite so active, because were it not for the fact that whatever the president of your association says at any of the meetings he attends is duly printed verbatim and distributed throughout the country, I would be able to deliver the same speech at every meeting and save a great deal of work.

It is a very great pleasure to be here with you in New England tonight. I have noticed with a great deal of interest the very enthusiastic gathering, the very high standard you have set for the convention and the very high class of gentlemen who are here in attendance. I have been wondering why it was that the New England Section appeared, at least at first sight, to have so much backbone, to be so superior to some of the other branches of the association. But it has occurred to me that it is probably due to the geography of your section and to your expanse of coast-line, and I have been reminded of a story which has been going the rounds recently and possibly has been heard by some of you, but I will chance that it has not been heard by all.

A young fellow had been keeping company with his young lady for several years and she had gotten to the point where she wanted to force the issue. They went down to the seashore one day and got into a quiet nook, and after they had sat there for about an hour he cleared his throat, and she said, "Did you start to say something, dear?' He said, "No, just some of this sand got into my mouth and I was trying to get rid of it." "Well," she said, "for heaven's sake swallow it and get it into your system." And so I think the sand on the New England seashore—and you have a good deal of it—. is responsible for the backbone of this organization.

I want to talk to you a few minutes on matters which are of importance to every central station man. It seems to me that every central station man should, in these times particularly, give a great deal of consideration to the various relationships which exist and should exist between him and his company and the people with whom he comes in contact. I think at the moment of six prominent relationships, and with your permission I will take them up briefly in the order in which I believe they exist.

In the first place, you are organized to render a public service. And that would seem to indicate that the most important relationship which exists is the relationship between you and your customers. I think the central station men of the present day are beginning to realize the importance of paying a great deal of attention to that relationship, to attempt to put themselves in the place of their customers and to inquire as to whether their relationship with their customers is all that it should be, and, if not, whether it is their fault or the customers' fault. The public is long-suffering—the customers are long suffering. It takes a great deal to arouse them. We may feel that the relationship between ourselves and our customers is of the pleasantest, but we may be at the same time resting calmly over a volcano. And when the relationship becomes strained, and when the long-suffering public finally does become aroused, matters are going to be very serious.

Now, farsightedness, I think, should characterize particularly the attitude of the central station man toward his customers, and he should be constantly studying their relation to him and his relation to them. In the past I think we have, in many ways, been inclined to consider the public service business, which is in our charge, as a private business. That has grown out of the old order of things. We have a feeling that we should run the business as we would run a manufacturing business, or any business which might be termed a private business. We should realize that this is not a private business. This is a public business. We are enjoying grants from the public. We are rendering a service to the public in which the public has a right to an opinion, and the opinions of the public should be thoroughly considered. We should keep our ear to the ground. We should feel the pulse of our customers, and we should preserve between ourselves and our customers at all times the most promising relationship for satisfaction on their part and for good business and prosperity on our part.

The next relationship which is of importance, not only to the central station people, but to every employer of labor, is the relationship between the employer and the employe—the relation between the central station and its employes. There is no question that the times we are living in indicate an increasing unrest on the part of the employes. And it should be the thought and the duty of the public service corporations to study that situation and to see that the employes of these companies are in all respects fairly and justly dealt with—that employes are given an opportunity, perhaps, to participate in the prosperity of the company; that the wants of the employes are considered. Remember that we are in a business, not for today nor for tomorrow, but for years, at least, and that the men and women who are employed by us in these corporations are going to live out their lives in the companies in which they are employed, in all probability. And if you can preserve a fine relationship between the corporation and its employes, there is no question that it will be a very farsighted thing from the standpoint of the corporation, and a very profitable thing. And so I think you should pay great attention to that relationship.

The third relationship I would class as your relationship to the public, as distinguished from the relationship between the company and its customers. Leaving aside your business, you owe certain duties and certain obligations to the general public of the community in which your business is located, regardless of the fact that a large percentage of the public are your customers. I think the electric lighting companies should set an example of good citizenship. And while I am on this subject, it gives me great pleasure to say that I have the good fortune this afternoon to visit the office building of the local company in Springfield; and I want to say that I think the Springfield company has set an example which we would all do well to emulate. I think that in erecting that splendid building which they occupy and in which they take care of the wants of their customers and of the public, they have shown a distinct civic interest in the city of Springfield and have shown to the citizens of Springfield that their only object is not to gather in money and disburse it in dividends to their stockholders, but that they are interested in helping beautify and make substantial the city of Springfield. And I believe that policy on their part is a very wise one and one which we may all copy with great care and with great consideration for the interests of the owners of our securities.

The fourth relationship is the relationship between the corporations and the municipalities and various authorities under which we operate. It is unnecessary to say that that relationship should also be farsighted—should be a wise and broad relationship. It is a characteristic of nature that nature expands along the line of least resistance. You see the great rivers and great glaciers of the continent flowing down through the valleys to the sea. It is a characteristic of animal life to adapt itself to the conditions existing around it and to work out its life and habits in accordance with those conditions. Now, man is a civilized animal, an animal of superior intelligence, and why should not he give at least as much consideration to the conditions which exist around him? I am speaking now, not of the natural interests, but of the interests which are created by society, by the conditions under which he lives and does business, by the temper of the people, of the public and the governments, which are representative of the public, under which he is doing business. It is much easier to flow with the stream than it is to go against it, and one of the greatest characteristics of the men who have been most successful in the world's history has been that perception which has enabled them to see and recognize the conditions existing about them and to adapt their lives and their affairs to those conditions.

The fifth relationship is the relationship between the electric lighting and power business and kindred industries. There are a great many people engaged in various branches of the electrical business. They may not be in the central station business. They may be on the contracting side of the business, they may be manufacturers or jobbers. But all these people are interested in some branch of the electrical business. Now, it seems to me that a great deal of attention should be given to the relationship between the central station man and his brothers in other branches of the business, and he should so arrange and adapt his business that he will take advantage of this relationship, that he will make his interests coincide with the interests of his brother in the contracting business, or with those of his brother in the manufacturing business; so that all of us will be working together for the general interest of the business. There has been too little consideration in the past to the interests of the other fellow. There is no question in my mind, and I do not think there can be any question in the mind of any thinking man, that a great deal more can be done by working together with the man in some other branch of the business than can be accomplished by working against him. I believe such institutions as the Electrical Men's Luncheon Club, which meets in Boston every Friday—a large percentage of the membership, I understand, is present here today—with that spirit which, I think, is spreading all over the country, should be fostered and encouraged, because they will certainly be for the benefit of all of us.

The fifth relationship to which we should give a great deal of attention is the relationship between different central stations. One company in a community may possibly, in spite of the fact that it doesn't have anything to do with its neighboring companies, grow up and become successful. But there is no question that the intercommunication of ideas and interchange of assistance between companies in the same business in different towns and different states can be of the greatest advantage to all concerned. Now, it is in this last relationship which the association of which it is my great pleasure to represent, stands. It is the association which is formed by you gentlemen, co-operating among yourselves in New England and co-operating with the owners of central station properties throughout the country to come together and in a co-operative way to protect your properties, to broaden your intelligence and work out all of the problems which present themselves to you. A great deal has been accomplished in the last ten years in the matter of organizing this industry in the United States. And I do not think we are a day too soon, gentlemen. I think we are at the present time meeting conditions which demand that we shall get together and stand together, which demand that we shall work out in the most complete form an organization which shall bring every man who is interested in any part of the electrical industry together with his fellows to stand with them for the protection of the business and for the furtherance of the business.

This convention proves in the most conclusive way the desirability of geographical and state sections. The national association is becoming very large. The recent plan of organizing geographical and state sections is, I believe, going to work out a very desirable result in this way. When you get together in a single state, or in a section of the country like New England, where men are within a short enough distance of each other so that they are well acquainted with each other, you meet men who are engaged in studying exactly the same problems that you are; you meet men whom you know and some with whom you have a close personal acquaintance. And in such meetings there is no question that you get down to the problems which are troubling you. There is no question that you get a greater advantage than you do in larger meetings, and I believe the future will show that the best work of the National Association will be done in these conventions of geographical and state sections.

I believe that as the industry is organized, as it gets larger, with a membership of 20,000 or 30,000 or 40,000 or 50,000 in the association, the parent body will, like the federal government, be a bond which holds all of these various smaller organizations together; it will be a means by which their forces can be called together in case of necessity. And it will probably do less and less of the investigation work and work of that kind than it has done in the past, and more and more of that work will be done by these geographical sections. It seems to me that all of you gentlemen should realize your responsibility for the perfect organization of your section of the country.

Now, if you will bear with me a moment longer, I should like to speak a word about the convention which we expect to have next June out in Seattle. The transportation circulars of the association will be out very soon—probably will be in your hands before this time next month. They have been provided by the transportation committee—and, by the way, the most efficient chairman of that committee is a New England man who is here in this room, and we all owe our thanks to him for the immense amount of work he has done in this connection. He and his committee have provided already six special trains—six routes by which you may be taken to the convention, and we hope you will all be out there. You can get any kind of trip, from the trip which will take you 34 days down to the trip by which you can go to Seattle, attend the convention and be back at your desk in Boston in 13 or 14 days, if you wish.

We are going to have out there, we believe, a very fine convention. It is an opportunity to go out to the coast which very few of us have had before. I know I look forward to it, and I believe you do; at least, you should. I believe all the men in the industry should say: "Here is an opportunity I have been waiting for all my life, and I am going to put my affairs in such shape that I can go out to that convention." There is much to be seen out there. It is an opportunity to broaden your scope and view, and it will certainly be worth the time and money spent to go out to the Seattle convention. I hope we will see a very large percentage of the New England Section out there in June. Thank you for your attention.

President Sands. The next speaker needs no introduction to many of you, for he was at one time one of our New England station managers. He has gone into the middle West and has there made a record as the president and manager of one of the large lighting and power companies. His abilities were long ago recognized by the leaders in the national association, and he has served that association as a member of its executive committee, as secretary, as second vice-president and in the capacity which he now holds. I know it is a pleasure for him to be with us tonight, and I know it is a still greater pleasure for us to have him with us. Gentlemen, I present Mr. F. M. Tait, vice-president of the National Association.

Mr. Tait. Mr. President and Gentlemen: I don't think I can tell you anything of very much interest to-night, and I am so enthusiastic about the National Electric Light Association and its work that I am fearful that if I should start to talk about that subject I might keep you here the greater part of the night, and I don't want to do that.

I do want to say a few words, however, about the work of the New England Section. I think what you have done and are doing has been a source and is a source of great satisfaction and encouragement to all of the officers of the National Electric Light Association. We want to work with you; we want to have you work with us, and we hope your Section will continue to grow and will soon have one thousand members, the number, I understand, you are trying to obtain, in the very near future. It seems to me that the work you are doing up here in New England must be of great and lasting benefit to the whole electric industry in this part of the country.

As your President has said, I am a New Englander by adoption. I spent several very happy years in Connecticut, and I always like to come back to this part of the country, because the warmth of greeting, which I receive, makes me feel that I am always welcome to my former home.

This is the first time I have had an opportunity of visiting any of the New England Section meetings, and I hope I may soon have the opportunity of doing it again. I thank you very much, gentlemen.

PRESIDENT SANDS. Before calling on the next speaker I shall ask you to listen to a gentleman on the floor who, I understand, wishes your attention for a moment. Mr. Baker.

MR. DAY BAKER. As our convention is drawing to a close, I think we should extend a vote of thanks to those who have helped us make it a success. Therefore, gentlemen, I move that a vote of thanks be extended to Mr. Walter Mulligan of the United Electric Company of Springfield for the most excellent manner in which he has provided entertainment for the members of the New England Section of the National Electric Light Association; to Mr. W. H. Daggett, Chief Engineer of the Springfield Fire Department, for his illustrated talk this afternoon and his practical exhibition of the electrical fire apparatus of his department; also, to the management of the Hotel Kimball, for the delightful way in which they have entertained us and made us their guests, and for the many courtesies extended to us.

I believe it also especially fitting that we extend to the press of Springfield a vote of thanks for the space it has given us, and to the reporters who have attended our convention and given us so much publicity. I should like to suggest that the secretary be instructed to communicate this vote to those mentioned.

(The motion was unanimously adopted.)

President Sands. The next speaker needs no introduction part he wished to take in the evening's program, replied that he wished to give the benediction. I have known him for some time and I have always had a high regard for his scholastic and literary abilities; but when it comes to those qualities which we usually attribute to a man who is to officiate in such a capacity, why—I am not so sure. However, since it is his request, I can do nothing but grant it, but if he doesn't measure up to the standard I refuse to assume any responsibility. Gentlemen, you all know the man—Secretary Martin of the National Association.

Mr. Martin. In my studies as a theological student, it was impressed upon me by my professors that one of the supreme qualities of a benediction was brevity. In that respect, therefore, gentlemen, I trust I shall not disappoint your retiring president at a moment when our golden Sands are running out, and certainly not disappoint you.

I am very glad, indeed, to be here again so soon and to have accomplished the trip with somewhat less hazard and speed than when I was able to greet you last September in the White Mountains, bringing with me not only the greetings of our president, but the cordial greetings of your old president, now president of the sister association on the Pacific Coast—Jim Davidson. And when I mention that name, permit me to say that there will be an awfully disappointed man on the Pacific Coast if he doesn't see a lot of you out there the coming June.

It is simply impossible for me to supplement or round out what our president of the national body has said tonight, and as he is retiring so soon you will understand that I say it in no idea of vain eulogy when I characterize that splendid speech as a fine example of the leadership which has made the National Electric Light Association what it is—the largest engineering and industrial organization of its character in the world, equalled by none in the influence which it exerts, the high ideals that it holds and the example that it sets to sister societies in industries.

I trust, gentlemen, that you will soon reach the 1000 membership which I understand lies before you so nearly in the immediate future. It really is incumbent upon you to reach that point at an early date in order to maintain your present high average and high percentage of efficiency. We had a meeting in New York on Thursday which gave us the largest increase in company membership in the National Electric Light Association that has ever been recorded. It is really astonishing that such high rates of increase can be maintained, and yet it is an exemplification of the high rate of increase which our industry maintains in investment, in earnings, in capacity and in service to the public.

At our meeting on Thursday we elected 1307 members who had qualified in less than two months, and of those 53 were central station companies and 1200 were the officers and employes of light and power companies.

With such statistics before us, I think we may entertain the fond hope of reaching figures which have been set us by the leaders of the industry, who believe that within a period of five years we may easily reach 40,000 or 50,000 members and even then we will not have accomplished that which is our mission and our duty to ourselves and our stockholders and to the public—the complete organization of the industry.

We have today nearly 1100 central station companies in our membership, but there are still some 3500 prospects, and a great many of them, gentlemen, are your own immediate friends and neighbors, whom you should bring into membership for their sake and for your own.

I should like in closing this benediction to reiterate what President Gilchrist has said with regard to the work of our transportation committee. It is no mean task to organize for a convention which is to be held on the other side of the continent, and I think it has been at considerable personal sacrifice—I know it has been as the result of indomitable perseverance and unlimited work—that Mr. Hodskinson,—our dear friend Charley,—has done for the association a work that has never been done before in planning for the success of that convention. I don't think I exaggerate, gentlemen, I think you will testify that I am telling the truth, when I say that Mr. Hodskinson has pushed aside the opportunity to rise to the highest offices in your organization in order that he might devote himself, humbly and with sacrifice, to the best interests of the National Electric Light Association as the parent body.

It is such work as that, it is such a spirit as that, which makes our national body successful, which makes it the power and influence that it is. And it is such a spirit, gentlemen, that will carry this New England section—which I am glad and proud to hold up as an example wherever I go throughout the country—to a membership which will enable you to wield in the affairs of New England the influence which belongs to us as "the best business in the world."

PRESIDENT SANDS. I want to thank you one and all for your splendid support and attendance, which have made this convention the most successful the section has yet had, and I now declare the third annual convention closed.

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PROCEEDINGS

OF THE

Fourth Annual
and
Fifth Annual
Conventions

New England Section of
the National Electric
Light Association

October 15, 16 and 17, 1912, Boston, Mass.
and
September 17, 18 and 19, 1913, Burlington, Vt.

PROCEEDINGS

OF THE

Fourth Annual Convention

NEW ENGLAND SECTION

OF THE

National Electric Light Association

MECHANICS BUILDING, BOSTON, MASS.
OCTOBER 15, 16 and 17, 1912

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Arthur B. Lisle, Vice-President, Providence, R. I.
W. E. Holmes, Treasurer, Cambridge, Mass.
Miss O. A. Bursiel, Secretary, Boston, Mass.

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L. J. Chase, Concord, N. H.
Geo. S. Haley, Rutland, Vt.
L. D. Gibbs, Boston, Mass.
A. F. Townsend, Woonsocket, R. I.
F. D. Adams, New Haven, Conn.
Howard T. Sands, (Ex-officio) Boston, Mass.

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W. S. Wyman, Central Maine Power Co., Waterville.
Howard E. Corning, Bangor Ry. & Elec. Co., Bangor.
T. J. Brown, General Electric Co., Portland.

New Hampshire.

John H. Wilson, Berlin Elec. Lt. Co., Berlin, Chairman.
J. P. Proctor, Franklin Lt. & Pr. Co., Franklin Falls.
G. L. Sadler, Nashua Lt., Ht. & Pr. Co., Nashua.
W. G. Meloon, Twin State Gas & Elec. Co., Dover.

Vermont.

E. E. Larrabee, Twin State Gas. & Elec. Co., Bennington, Chairman.
A. B. Marsden, Manchester Lt. & Pr. Co., Manchester.
Walter H. Vorce, Vermont Pr. & Mfg. Co., St. Albans.
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Massachusetts.

L. D. **Gibbs**, The Edison Elec. Ill. Co., of Boston, Chairman.
H. B. **Gilmore**, Western Elec. Co., Boston.
E. S. **Hamblen**, Weymouth Lt. & Pr. Co., E. Weymouth.
H. M. **Parsons**, Central Mass. Elec. Co., Palmer.
H. T. **Sands**, Malden Elec. Co., Boston.
Fred H. **Smith**, Worcester Elec. Co., Worcester.
H. W. **Stevens**, The Edison Elec. Ill. Co., of Boston.
H. H. **Van Staagen**, Westinghouse Elec. & Mfg. Co., Boston.

Rhode Island.

Alfred F. **Townsend**, Woonsocket Elec. Mach. & Pr. Co., Woonsocket, Chairman.
Arthur B. **Lisle**, Narragansett Elec. Ltg. Co., Providence.
S. B. **Tuell**, Pawtucket Elec. Co., Pawtucket.
M. H. **Spellman**, Westerly Lt. & Pr. Co., Westerly.

Connecticut.

F. D. **Adams**, The United Ill. Co., New Haven, Chairman.
C. A. **Paul**, The United Ill. Co., Bridgeport.
Chas. A. **Learned**, Meriden Elec. Lt. Co., Meriden.
Wm. M. **Lewis**, Rockville Gas & Elec. Co., Rockville.
F. W. **Prince**, The Hartford Elec. Lt. Co., Hartford.
R. A. **Manwaring**, The United Ill. Co., New Haven.
S. A. **Smith**, United Elec. Lt. & Water Co., Waterbury.

RATE COMMITTEE

W. B. **Bragdon**, Presumpscot Elec. Co., Westbrook, Me.
W. G. **Meloon**, Twin State Gas & Elec. Co., Dover, N. H.
H. D. **Larrabee**, Consolidated Ltg. Co., Montpelier, Vt.
L. R. **Wallis**, Boston Edison Co., Boston, Mass.
Abel **Reynolds**, Chairman, Narragansett Elec. Ltg. Co., Providence, R. I.
E. F. **Lawton**, Hartford Elec. Lt. Co., Hartford, Conn.

Proceedings of the Fourth Annual Convention of the New England Section of the National Electric Light Association held in Mechanics Building, Boston, Mass.

OCTOBER 15, 16 AND 17, 1912.

The fourth annual convention of the New England Section of the National Electric Light Association was held in Mechanics Building, Boston, October 15, 16 and 17, under the Presidency of Mr. J. S. Whitaker.

The president called the convention to order at 11 A. M., on Tuesday, Oct. 15, and addressed the delegates as follows:

PRESIDENT'S ADDRESS.

Gentlemen: It is a great privilege to welcome you all to this convention.

We, who are members of the New England Section, are very much at home here and are glad to gather once more, but we are especially pleased to welcome members from other Sections who do us the honor to be present. We hope, gentlemen, that you not only will have a good time, but that you will feel at home among us and join freely in our discussions.

This convention is somewhat of a departure from our former habits. By an amendment to our constitution, adopted last spring, this becomes our Fourth Annual Meeting, and at the executive session next Thursday afternoon you will elect officers for the ensuing year. It has been our custom in the past to hold the fall convention away from Boston, but this year the Electric Show has magnetized us with a flux too great to be overcome by the attractions of seashore or mountain resorts.

The program for this convention has been arranged to touch upon a few of the various activities of the central station. Papers have been prepared by able authors and will be found entertaining and instructive. Please bear in mind, however, that no paper, no matter how able or how carefully prepared, is complete until it has been thoroughly discussed,—so that our records may show not only the opinion of the author, but the sentiment of the association. With this in mind, your program has been prepared with a less number of papers than usual, and it is expected that you will take full advantage of your opportunity.

The report of your Secretary will show that the Section is still growing, not only in numbers but in the amount and quality of service it is able to render to its members.

I trust this association will always keep service for its ideal, for that is the real measure of its worth and the only legitimate reason for its existence. With real service being rendered, we need have no fears regarding growth in membership.

The report of your Treasurer will show the present state of the Section's finances, which would be quite satisfactory were it not for the fact that a portion of our revenue for this year has not yet become payable, owing to the fact that some of you are delinquent in paying your dues to the National Association.

I regret to report to you that the National Association has deemed it necessary to curtail somewhat the appropriation of funds for the use of Geographic Sections. We are now allowed 50% of the annual dues paid by members of the section. But at the Seattle convention last June the constitution of the National Electric Light Association was amended so that Article 16, Section 1, now reads as follows:

"Upon certification to the Treasurer of the National Electric Light Association by the executive officers of any Geographic Section, stating the membership of such section who have paid dues for the full calendar year, and upon approval of the Executive Committee, the Treasurer of the National Electric Light Association shall pay over to the proper officers of the said section an amount not to exceed 50% of the fixed yearly dues received from all the Class A and Class D members of the section and an amount not to exceed 50% of the yearly dues received from the Class B and Class E members of the section up to a membership of 500, and an amount not to exceed 25% of the yearly dues of the Class B and Class E members for membership from 500 to 1000. The Executive Committee, however, shall limit these appropriations to the necessary and reasonable expenses of the section. The section officers shall file a budget during January of the estimated expenses for the ensuing year, for the approval of the Executive Committee and shall also file a detailed statement of the actual expenses at the close of each year."

This change does not effect our revenue for the present year, but will reduce it somewhat in the future.

It seems fitting to remind you at this time that the central station as a commercial industry is but thirty years old. In the United States at the present time this industry is said to represent an investment of about $2,500,000,000, with annual gross earnings of about $340,000,000.

It would be unsafe to indulge in any prophesies regarding the future growth of the central station, but that there are untold possibilities for its development no one can doubt. We now see our service being successfully extended to communities that were, but a few years ago, considered commercially inaccessible. New applications of electric energy are continually being devised to lighten the labor of mankind and increase the efficiency of human energy.

The National Electric Light Association holds a commanding position as the leading organization of the industry, and exerts a tremendous influence for its good. That body at the present time has 12,500 members, representing about 90% of the investment in central station properties in this country.

The New England States, with but 2% of the area and 7% of the population of the United States, have about 10% of the total investment in central station properties. The New England Section represents about 90% of the investments in its territory, but falls behind somewhat in its proportion of membership, a condition which I hope you will remedy in the very near future.

In closing, I wish to express my appreciation of the unfailing courtesy and consideration always extended to our section and its representative by the officers of the National Association.

I also wish to thank the officers and members of the various committees of the Section for the untiring efforts which they have all willingly given for the good of the Association.

THE PRESIDENT. The next thing on the program is the report of the Secretary, which the Treasurer will read.

REPORT OF THE SECRETARY.

MISS O. A. BURSIEL.

Shortly after our large convention held in Springfield, Mass., it was my great pleasure to attend the larger convention of the National Electric Light Association in Seattle. I wish to again express my sincere appreciation of the opportunity afforded me to take such a wonderful trip and to be one of the convention delegates.

I joined the workers from the National Association Headquarters in New York, and we went on the Red Special as far as Chicago, there we were obliged to leave that happy party and go on by ourselves in order to arrive in Seattle in time to take up the immense amount of detail work preliminary to the opening of the big convention. We arrived in Seattle one week before the convention opened and from that time until the convention closed it was a ceaseless round of strenuous work. We all enjoyed it, however, because there is always inspiration in any work no matter how much given to detail it is, if it is done to boost the Electric game.

Upon my return to the office the volume of Proceedings of the last two conventions was printed and mailed to the entire membership of the Section.

Early in the summer the Executive Committee decided that the Fourth Annual Convention should be held in Boston during the 1912 Boston Electric Show, and that we should invite the entire membership of the National Electric Light Association. In line with this decision the period of the convention was lengthened to three days and plans made for a program to include seven papers. These have been printed and are now available with one exception. Circulars and registration cards were mailed to every member of the National Association east of Ohio, others being invited through the pages of the Bulletin.

Since the first of the year there have been 160 new members in all classes added to our New England Section, and we desire to reach the one thousand mark as soon as possible. We need only 140 more to do this.

The work in connection with the weekly meetings of the Luncheon Club Branch has been carried on in the Section office. These meetings which were discontinued in June are to resume this week Friday, the 18th, at the usual place—the American House.

Many inquiries have been made at the Section Headquarters for a distinctive New England Section lapel button. I trust all will be pleased with the result in blue and white enamel, which we are using at this convention with a blue ribbon added as the convention badge for members. These buttons will also be on sale at the Section Headquarters for anyone desiring them at any time.

On motion, the report of the Secretary was accepted and placed on file.

THE PRESIDENT. We will now listen to the report of the Treasurer.

REPORT OF THE TREASURER.

WELLES E. HOLMES.

Boston, Mass., October 15, 1912.

To the Members of the New England Section of the National Electric Light Association:—

GENTLEMEN:—I beg to submit the following report for the year ended October 1, 1912:

RECEIPTS.

January 1, 1912, Balance of cash on hand	$ 86.36
January 10, 1912, Rec'd from N. E. L. A. refunds	250.00
February 17, 1912, Rec'd from N. E. L. A. refunds	500.00
March 19, 1912, Rec'd from N. E. L. A. refunds	500.00
May 20, 1912, Rec'd from N. E. L. A. refunds	500.00
August 9, 1912, Rec'd from N. E. L. A. refunds	500.00
September 20, 1912, Rec'd from N. E. L. A. refunds	100.00
Total	$2,436.36

EXPENDITURES.

As per receipted vouchers	$2,399.63
Balance of cash on hand October 1, 1912	36.73

The President appointed A. S. Nichols and E. A. Barrows a committee to audit the books of the Treasurer.

The Treasurer read the report of the Executive Committee, as follows:

REPORT OF THE EXECUTIVE COMMITTEE OF THE NEW ENGLAND SECTION NATIONAL ELECTRIC LIGHT ASSOCIATION.

Since the last convention in March the Executive Committee have held five meetings with an average attendance of seven members.

In May Mr. George S. Haley of Rutland, Vt., moved to another part of the country, causing a vacancy on the Executive Committee staff and Mr. C. C. Wells of Middlebury, Vt., was appointed by the Executive Committee to serve as the member from Vermont.

Much time has been spent in planning preparations in connection with this big convention by the Committee.

THE PRESIDENT. The Treasurer has a letter which he will read.

The Treasurer read the following letter:

The Orchard, Arlington, Vt., Oct. 7.

New England Section, National Electric Light Association,
Boston.

GENTLEMEN:—I thank you heartily for inviting me to attend your convention. I wish I might do so, for it would be a joy to me to meet the many friends that will be in attendance. It seems to me impracticable, however, and I can only send you my best wishes for a successful meeting, a meeting helpful to every one of you.

(Sgd) HARRIET BILLINGS,
Asst. Sec'y N. E. L. A.

The President appointed the following committee to nominate officers for the ensuing year:

E. R. Davenport, D. S. Boyden, F. D. Gordon, E. E. Larrabee and George L. Sadler.

The President. The next on the program is a paper on "The Education and Welfare of the Employee" by Alfred S. Nichols of the Woonsocket Electric Machine and Power Co., Woonsocket, R. I.

THE EDUCATION AND WELFARE OF THE EMPLOYEE.

By Alfred S. Nichols.

The world of business is passing through a period of industrial evolution, the principal cause of which is the desire to attain a satisfactory adjustment of the relation of employer and employee.

The desirability of the solution of the problems involved agitates the realm of politics, the function of which is to devise the methods by which equity may be administered to all. Therefore, we frequently observe that the mantle of power descends upon the partisan who most successfully appeals to the electorate with plans for the betterment of the condition of the laboring classes.

As a result legislatures are engaged with the enactment of industrial laws which concern the various schemes for the good of the wage earner, and humanity moves apace along devious paths towards the era when it shall more generally apply the principles of the golden rule.

It is appropriate that attention be devoted to the subject because the entire social and economic structure is vitally concerned in the welfare of the employee.

A proper appreciation of the moral obligation which rests upon the employer in relation to the wage earner, ought to exist in every industry.

If we ignore the latter we cannot afford to evade consideration of the value of the welfare of the man who labors for a daily or weekly wage for strictly business reasons, important of which is the fact that the organization that does not devote attention to the development of a happy condition in relation to the industrial unit cannot hope to attain real efficiency in its service.

The problems concerned with the proper relation of capital and labor are indeed involved and the attempts to solve them often retarded by the selfish and mean ambition of those who fatten on strife.

The unscrupulous politician with his nostrums for the various industrial ills, appealing to ignorance and playing upon prejudice is a sorry character in truth.

But the contribution of this pseudo champion of labor to the amelioration of the condition of the laboring class, is not an atom less than that of the employer who considers his obligation discharged with the payment of the wage and treats with apathy the contention that a responsibility to society rests upon the employer to deal with labor in accordance with accepted standards.

The incorporation into law of any equitable welfare scheme is commendable, but legislation running rampant without consideration of the rights of capital is not only deplorable but retrogressive.

Our attention is drawn to the pronounced socialistic tendency abroad, where it appears that the State is assuming a position in the effort to obtain a correct relation between capital and labor, which is too paternalistic to be conducive to a healthy condition, as witness the Compulsory Insurance Act, now in force in England.

There may be merit in this particular law, but the many-voiced protests now heard do not indicate popularity for the measure.

It is an illustration of the truism that in all movements of human interest the extremist is always evident.

The dreamer may sit in the seat of the mighty but his tenure is brief, because the average citizen with his well-balanced appreciation of the rights of all parties to the issue, can make a nice distinction between things ephemeral and practical.

At no time has there been a more pressing need of the sound judgment and ripe experience of business men in our legislatures than to-day.

The welfare of the employee aside from its humanitarian aspect, presents an economic value of no mean proportion.

In other days, the worth of the bondsman was determinate upon his physical well-being and ability to perform laborious tasks. His value in the medium of exchange was exactly in proportion to these factors.

The principle of the value of physical fitness of the wage earner in the industrial world to-day is just as potent, and the methods by which his state may be developed does, and ought by right, receive recognition and encouragement.

That an underpaid, and consequently ill-nourished employee does not equal in productive value his more fortunate brother cannot be denied.

Any analysis of economic waste must include consideration of the factors of content and environment of the industrial unit.

The master men of the Electric Lighting Industry appreciate these truths, and treat matters pertinent to the advantages of the employee from an attitude characterized by a broad humanity, ulterior to the dollar.

It may be said of the business with which we are concerned, that it has not required the force of law to obtain consideration of the welfare of labor, or to deliver a just measure of compensation to employees injured in the performance of their duty.

It is the desire of every central station to prevent accidents, and it is remarkable how few occur. Careful management requires adequate rules and safety devices for the protection of operating employees, and it ought not to require the force of industrial law to insure their application.

It is generally agreed that unless an accident is the result of culpable negligence on the part of the employee, a moral responsibility rests upon the Industry to provide for his proper care and compensation.

We do not view with alarm the minimum Wage or Workman's Compensation Act, as the industry generally has voluntarily practiced the principles now legally enforced in many states.

The significance of the subject of the welfare of employees appeals particularly to Public Utilities, as a large percentage of their employees are in constant contact with a critical public, and the interest of the Company in this direction is best advantaged through healthy, contented and loyal employees.

The attention which the National Electric Light Association devotes to this subject indicates its importance, and the practice of the various accepted schemes by the member companies marks the advance toward the object in view.

The adaptability of the various welfare plans advocated by the Public Policy Committee is contingent upon the size of the company, its financial resources and the personality of its employees.

A service annuity or pension scheme which may be practicable in the larger organizations might not apply with equal feasibility in a smaller company. On the other hand, a profit-sharing plan that might work splendidly with the latter might fail in its purpose in regard to the former.

It is not possible, therefore, for every organization to adapt these methods to its own especial needs, but progressive public policy demands that every central station should stand pre-eminent in the community it serves in all that concerns a happy condition of the wage earner, and any effort spent to achieve the desideratum will be amply recompensed.

I have endeavored to outline our general attitude in regard to this subject, and to indicate its importance and contiguity to efficiency.

It has not been the purpose to explain or advance any particular scheme, mainly because the principles underlying Service Annuities, Pensions or Profit Sharing Plans are generally understood and considered with the needs of the particular company and its resources in view.

In treating with a subject such as the one in hand, the personal experience in working out the ideas involved is, perhaps, the most important and interesting factor. An outline of what we are doing in the Woonsocket Gas Company and Woonsocket Electric Machine & Power Company may present ideas and methods that are practicable in the average company.

We endeavor to pay particular attention to the condition under which employees labor, whose duty confines them to offices and elsewhere. We believe that good ventilation should be a rule, because a vitiated atmosphere affects the health and decreases efficiency.

The Stone & Webster organization operates companies widely distributed, and.as a result it is possible to sometimes benefit an employee whose health requires a change of climate by transferring him to a more congenial field.

It is desirable to encourage a spirit of thrift and independence among our employees. This effort we believe should be primal, as its results are of more value to the individual than those involved in any other scheme.

To this end our Organization offers the advantage of the Employees' Investment Association, with which he may deposit his savings. The Board of Trustees consists of men prominent in the organization, whose duty it is to invest the funds safely and in so far as practicable, in securities of companies within the organization, so that in effect the employees have an ownership and vital interest in the organization as a whole.

The returns upon investments have been somewhat larger than could have been obtained in savings banks, and the fact that the opportunity is appreciated by all classes of our employees, is witnessed by the statement that on June 30, 1912 the Association had 1,693 depositors, whose savings amounted to the sum of $726,056.

It is our experience that orderliness in all departments finds its emulation, and has a distinct influence upon the personal habits of the working force.

We endeavor to impress on each employee the fact that his success lies within his ability to achieve, that the efficiency of any department reflects credit upon each employee, and not necessarily upon the executive, to the exclusion of the unit of the working force.

In order to carry into practice these ideas, the Stone &

Webster Organization under which our companies operate, keeps a very complete record of the employees' ability, qualifications and personality. We try to ascertain the goal of his ambition and bring him to appreciate that we are interested in him and his success. There is always a need in an organization with so wide a scope of men who possess ability and ambition, and there is offered to the worthy opportunity and reward.

The complex and technical nature of the industry requires of its labor a relatively high standard of intelligence. Efficient service and the ease with which public opinion may be moulded, frequently without warrant to a state antagonistic to the best interest of the Company, require that attention be devoted to the education of the unit, in order that he may propagate by action and word the principles which are the dominating factors in the policy of the organization. To adequately interpret the Company personality, the employee must understand what the term involves, and demonstrate through his daily work and contact with the variable personalities that constitute the public, the business virtues that make possible a better understanding between the Public Utility and its customers.

It is desirable, then, to work out a scheme through which it shall be possible to inculcate the fundamentals of Public Service and policy.

By what method to best proceed to convert the raw material into a thoroughly efficient employee and solicitor of good will is often a matter of conjecture.

Unquestionably, it is the duty of each head of department to train the employee under his control, in order that they may produce a quality of service effective of a happy relation between the Company and the community it serves.

The efficacy of the efforts of the various officials will, however, vary in proportion to their appreciation of the fundamentals of public service and the value of good-will. In view of this fact it is well indeed if the company can arrange a plan through which its employees may be collectively educated to a proper attitude towards the public.

There is no better or more elastic medium to this end than an Employees' Club. Through this instrument the departments are merged upon a common ground, and the employees of each may learn something of the other to the general advantage of both.

Officials and men may meet free from the restraint of business hours, and ample opportunity is presented to discuss problems that arise which the urgency of the work in hand during the day may tempt one to avoid.

During the long evenings of autumn and winter especially, the Club idea appeals to the men and it is an easy matter to arouse an interest in the plans for their individual betterment.

Our Woonsocket Companies, in order to develop this idea, organized the Woonsocket Gas and Electric Employees' Club about two years ago. We believe that we have experienced more than ordinary success in regard to the development an *esprit du corps* and increased efficiency as a result of our educational work.

The control of the Club is vested in a Board of Governors, consisting of the Executive Heads of Departments and the officers of the Club.

The officers consist of a President, Secretary and Treasurer elected by the employees. Heads of Departments are excluded from these positions.

A House Committee, consisting of four members, is responsible for the entertainment and social feature.

The Club has a printed constitution, and rules for the governance of the members. All expenditures are subject to the approval of the Board of Governors and the Manager of the Companies.

Last year the Governing Board of the Club arranged for a series of talks and papers upon a wide range of subjects. Regular meetings were held bi-monthly, and a simple lunch provided for the members out of a fund alloted by the Companies to the House Committee. We aroused a healthy interest in these meetings by encouraging debate and giving each employee who had something of interest to say or offer, an opportunity to make it known. We installed a "Question Box" in which questions concerning the operation and policy of the Company might be deposited, and a keen and friendly rivalry was aroused between the departments in the effort to put a puzzling question to the other fellow.

The subjects of the papers read last season are as follows:

Economy.
Gas Manufacture.
What Maximum Efficiency Means.
Load Factor.
Office Records.
Gas Appliances.
Turbines.
Line Losses.
Hydro Electric Power.
Line Construction.
Street Mains and Services.
Gas Meters.
Electric Meters.
Work at Keokuk.

It has been our experience that the meetings and papers read and discussed by the men not only developed the confidence of the men in themselves, but gave to the heads of departments intimation of the latent possibilities in employees who hitherto had not been considered above the ordinary. It was frequently possible, as a result of questions raised by men of the different departments, to locate a deficiency in the system where the work of co-ordinate departments broached upon each other.

Through a voluntary subscription by the members of the Club, the sum of which was further increased by a donation on the part of the firm of Stone & Webster, the Club was enabled to purchase a fair library of technical books. The Company furnishes an ample supply of the best trade magazines and current periodicals for the Reading Room and the manner in which the men have taken advantage of it is gratifying indeed. Through the Library Department of the Stone & Webster Management Association, we are informed through monthly catalogues of the various current topics and books of interest to the industry.

Not the least interesting, or effective, talks of the season were those of the employees told without embellishment, in the vernacular of the job. Thoroughly appreciating the fact that any educational plan to be successful, should be judiciously mixed with entertainment, encouragement is given to the development of the social feature of the Club.

The operation of the Woonsocket Gas and Electric Employees' Club is entirely in the hands of the employees. The officers are chosen from among the men and every effort is made to arouse a strong proprietory interest in the Club. The general policy and educational work in connection with the Club is determined by the Governing Board, consisting of the heads of departments and the officers chosen by the members. The operating expenses are borne entirely by the Company. The rooms are kept scrupulously clean, and it is interesting to note that although they are frequented by all classes of employees, from the firemen to the manager, the depreciation on the furniture as a result of two years' wear is very little.

We endeavor to select subjects that are generally interesting, and to illustrate as thoroughly as possible through the use of models when they concern operation.

It is difficult to gauge the actual results of an educational scheme in connection with employees in so short a space of time, but it is certain that the number of complaints has been considerably reduced, and that we already can see an improvement in the general efficiency of our organization. The education of the central station employees should be approached with due consideration of the wide divergency in training and education of different classes of men who come to the melting pot of Public Utilities to be molded into efficient servants of the public and the company. It should involve that course which is possible of the best results from the greatest number.

The majority tire quickly of technical talks, too profound for the average mind which has not been trained to grasp the intricate details, the mastery of which must be left to individual ambition.

We encourage the discussion of questions concerning the Company's relation to the Public, and endeavor to impress the men with the importance of permitting no opportunity to pass that makes possible a thoroughly courteous and efficient service.

What should the company do to assist the employee, where does this duty end, and that of the employee in promoting his own interest, begin?

It is our opinion that if a company furnishes such educational facilities as are within its resources, from among the aggregate those individuals that possess the ambition and desire to succeed will grasp the opportunity offered, and the seed sown by the company will bear fruit.

If the company maintains a Club or Study Room and furnishes a library and trade literature, we believe that the man who seeks to improve himself will be found using it, and that the distribution of subscriptions among employees or the payment of dues which should be met by the individual represents money ill spent.

These things and the mastery of the intricate and technical detail of the business should spring from the individual ambition.

The function of the company ceases when the lack of interest of the employee indicates that the well-meant efforts of the former are useless.

The operating expenses of an Employees' Club should be borne by the company, if the best results are sought.

The tireless energy and resources which mark the electrical business in the field must be applied to the Club. It should be considered an integral part of the company and its maximum efficiency sought through constant application of intelligent direction, engendered by the needs of the men and the organization.

If intelligent direction or well-planned policy is lacking, the Club will fall into desuetude and serve a purpose that does not transcend that of place where men may play pool or billiards.

There is nothing new offered in the suggestion of the value of an Employees' Club. A large number of companies have such an institution. Others have tried to put the idea into practice only to see the result of their efforts die a lingering death.

The reason for failure invariably has been the lack of active interest on the part of heads of departments. We believe that to make a successful Club, every official of the company should not only endeavor to arouse interest among the men, but should indicate by their presence at the Club meeting the importance that the company attaches to the work.

It is not an easy task to arouse ambition, inculcate courtesy, self-control, or to train the employee to meet the requirements of the ideal. Success in this direction depends upon example, definite planning and persistent effort. Any method that will bring about the desired result, then, is worth while.

The President. Gentlemen, we have listened with a great deal of pleasure to this paper. It is a valuable contribution. I will ask Mr. Sands if he will open the discussion.

Mr. Sands. The subject of Mr. Nichols' paper indicated a two-fold purpose—the education of the employee and the welfare of the employee. Neither one is the result of the other, and neither, to my mind, can be attempted successfully unless the other is borne in mind.

Many of the so-called welfare schemes which we have seen tried out, some of them on a very large scale, have failed because they have been approached purely from a sensational standpoint. And as a result of that attitude on the part of the employer, the employee has been made to feel that he is an object of charity; and it has been my experience that that is the last thing that the employee wants. He doesn't want charity. He wants justice.

The education of the employee is doubtless the more difficult thing to work out and to approach in a proper manner. With the companies, having a very large percentage of their employees men with more or less of a technical education and training, this matter is comparatively easy. But with the smaller companies, where comparatively few have had the advantage of such education, the matter is a difficult one indeed.

The great danger in those companies is in outlining a course of talks or study which may shoot over the boys' heads, so to speak, and thereby cause them to lose their courage. I have seen some of the most excellent papers prepared by technical men, and prepared with the best intent, for employees' clubs, which have utterly failed because they have failed to grasp the mental attitude and mental capacity of the average man who is to listen to those papers.

I believe that the success of any of the employees' clubs must depend upon the way in which the manager approaches this work, and it is very evident from Mr. Nichols' paper that the success of the Woonsocket club arises from that one fact, that the work has been approached both from a business and a humanitarian standpoint.

It is rather significant, if we stop to think of it a moment, how we study to increase the efficiency of our generating stations, of our transformers, our motors, etc. We buy a piece of apparatus and we no sooner get it installed than we hear of some improvement, some auxiliary apparatus, perhaps, the installation of which will greatly increase the efficiency of our machines. We sit down, take pencil and paper and figure up the investment and the saving and decide as to whether we will install that apparatus or not. And all the time we have about us pieces of apparatus—and I say this in no mean spirit—capable of endless increase in efficiency, and what are we doing to gain the desired results?

So I say that in approaching this work, we must look at it from the business standpoint. But it will not suffice to look at it from the business standpoint alone. One of the largest concerns in this country and one of the first to undertake welfare work—work which was undertaken at that time on a scale of magnitude such as had never been seen in this country—failed utterly and failed because they had overlooked the humanitarian side; because along with the various welfare schemes which were put forward went practices in the business conduct of the company, in repeated changes in the schedule of piece-work of the employees, which practically resulted in the employees paying the fiddler. And when the employee woke up and saw where he was at, the result was a most dismal failure.

The companies with which I am associated began about five years ago the forming of employees' clubs. The work is being carried on now and I think, in the main, we can congratulate ourselves that it is successful. It means work, it means care, it means study. And to the employer who thinks he can undertake this work and not give a great deal of thought or time to it, I would say—don't undertake it. Everything depends upon the spirit in which you approach it. You may have a desire to increase the efficiency of your men. You may have a desire to educate them so that they may become more efficient employees. But unless above and beyond this, you have deep down in your heart an earnest, human interest in every employee and look upon him, not merely as an employee whose duty it is to do a certain amount of routine labor, but as a man with hopes and aspirations and ambitions just the same as you have, and recognize that he, too, desires to grow and that he has possibilities of growth, the work will be futile and the result, failure.

THE PRESIDENT. I believe we have with us Mr. F. C. Henderschott, who is Secreary of the New York Company Section, and also in charge of its educational work. We should all be glad to hear from Mr. Henderschott.

MR. HENDERSCHOTT. I think any member of the National Electric Light Association always feels at home in a convention of any branch of the association, and I want to say that I feel perfectly at home here today.

I am not going to discuss Mr. Nichols' very able paper. I am going to tell you briefly what has been accomplished by the New York Edison Company in the line of educational work. We have published a little booklet called "Educational and Welfare Work," which includes a syllabus of our three distinct educational courses, and also gives an idea of the welfare work the company is doing. There are plenty copies of it here and any one who desires a copy is welcome to it.

About seven or eight years ago the Employees' Association came into existence and has been very successful. The company pays a certain portion of the expense of this organization and a certain portion of it is assessed on the members, as we believe we get much better results in that way than if the company paid all the expenses.

I shall not speak of that feature of the business, except to say that our technical courses, which have been running about four years, are now divided into terms covering a four-year period. Employees on graduating from these courses are awarded some minor prize. Enrolment is optional. Courses are held in the evening.

About 30 per cent. of those who enrolled finished the courses. We are going to start this fall a course for our accountants. That will also be conducted under the auspices of the educational committee of the Employees' Association, and enrolment will be optional.

I am more interested, however, in our commercial courses. I belong to the commercial department of the company. Mr. Arthur Williams, who is well known to most of you, I am sure, conceived the idea about 18 months ago that the time had arrived when the commercial forces of a corporation operating in so large a territory as we have should be educated.

There were two objects sought: first, to render a better service to the public. It is needless to say that the measure of service which you render determines the amount of goodwill which the public service corporation enjoys. The second object sought was to increase individual efficiency. We realized that the time is coming and coming very rapidly when the large public service corporations must have a greater degree of individual efficiency. Therefore, we started out to make a canvass of the country to ascertain what there was in existence among other corporations, not confined to the electrical industry, in the way of educational courses, and after a very careful survey of the situation we concluded that we had to frame up something all our own.

We started our commercial school on the 29th day of last December, having outlined four courses. The first course, I think, is applicable to practically every electrical operating company. It is divided into three parts. The first part is the "Elements of Central Station Business Getting," and consists of 12 lectures, which can be compiled very readily by some one in almost any department. The second part consists of six lectures on the "Fundamental Principles of Electricity." This is somewhat technical, but we try not to be too technical. These two sections of our first course, as you will see, can be made constructive. Then we have a third part of that course, called "Basic Principles of Individual Efficiency" —rather a high-sounding title, and yet we find it works very well. And under that head we give talks on the subject of "The Value of Right Thinking," "Courtesy," "Education—What to Learn," "The Power of Confidence," "Self-Development," etc.

There are 26 lectures in the course which has now become our first year course. We have only a few statistics that we can give you. Last year the commercial school courses ran for a period of four months, from January to May. The enrolment in the courses is optional. The lectures are all given on the company's time. The employees are paid to be there and must be there. Written examinations are also compulsory. The employees who are enrolled in the course meet in the Company's library on the same day one week later and do their examinations under the eye of the instructor in charge.

Out of a total of 312 employees eligible, 249 were enrolled. We did not enroll managers or assistant managers. We graduated 80. They received certificates bearing the Company's seal, similar to a diploma in the professions. Only 11 received Certificate A, with a marking of 87½ to 95, the highest marking being 95; 37 received Certificate B, with a marking of from 82½ to 87½, and 32 received Certificate C. Certificate C is very unsatisfactory, but the employee must attain a rating of 75 per cent. or better in his school work in order to receive that certificate. Most of those who have received C Certificates have re-enrolled for the course this year and will endeavor to improve their standing.

Now, the result of our work, from the Company's standpoint, was the taking away from business of 13,350 hours and turning it over to educational work. But the Company's business during that period increased, taking the number of new meters set 20.5 per cent. over the business of the same period in the previous year. In fact, the New York Edison Company is enjoying its most prosperous year. We don't claim all this is due to the educational work, but it has been so satisfactory to the company that they have incorporated it as part of their policy, and the courses have now been made two-year courses.

Twenty-seven enrolled employees failed; that is, 27 of those who had attended a sufficient number of lectures to have enabled them to graduate. It is interesting to note, however, that of those 27 all were either record clerks or office boys, showing that they had not a sufficient preliminary training to enable them to grasp some of the work which was given.

That course consists of a first year term. The employee must graduate from that term with a standing of 75 per cent. or better in order to enter second-year work, which is divided into three courses. Our second course is one that was laughed at at the start. It embraces hygiene, health, recreation, and elements of psychology. It has proved one of the most valuable of the courses. Its lectures are given by men of national authority on those subjects. That course is not a constructive course. Course III is likewise not a constructive course, but deals with the "basic principles of salesmanship" and their relation to business building, and the lecturers are all men of national reputation.

Course IV in the second year term is a study of the policies and organization of the New York Edison Company, including 26 lectures given by managers of bureaus and heads of departments. It is a constructive course and one that we have found exceedingly helpful.

The New York Edison Company, as I have stated before, is pleased with what has been accomplished, because it is spending considerable money to carry on the work. All these courses, of course, would not be applicable to smaller companies, but most of the work done in our company could be done in the smaller companies by securing proper lectures or books upon the subjects treated and having lectures made up along those lines.

One of the first things you will encounter will be the attitude of the employees. When I talked with Mr. J. E. Rogers, assistant sales manager of the National Cash Register Company, which started the first corporation school in the United States 18 years ago, he told me that was the greatest problem. He said salesmen came in, after Mr. Patterson had decided to give this educational course, with an attitude that was distinctly hostile. They had been selling cash registers for a good many years, some of them, and the idea of their being brought in there to be taught how to sell cash registers didn't suit them at all. And neither did it suit our employees to be told that they should go to school to learn their business.

I remember one man high up in one of the departments who turned to another man high up in another department and said: "Have you an apple for recess?" It was considered a joke. The older men in the company resented it very much. But we hadn't been going very long before all that hostility disappeared and the attitude now is one of sympathy and hearty co-operation. In fact, one of the problems that confront us now is to keep our employees after we have developed them. We find it dangerous to develop a $1000 man into a $2000 and leave him in the $1000 position. He won't stay there and you are apt to lose him. And so you will have to rearrange your system of promotions to take care of those people. After you have found the man and developed him, he must be taken care of. That is one of our problems and we have met it by establishing a personal record of each employee. We have a record blank to make out, a record of the man's age, education, what he did before he came to the company, what he has done since, what each man under him says about him, temperament, health, etc., and this record is available to the head of the department, Mr. Williams, together with the employee's school record; and we find when there is a vacancy it is comparatively easy to pick the man for the position we have to fill. Those, so far as I know, are the only figures available.

Our second year of the commercial school opens next Monday to close on the seventh day of May. The aim is to give about six months' schooling each year and make it a two years' course.

Some of our men who have A certificates have left to take responsible positions elsewhere. One of them left today, going to take the new business department of the Public Service Corporation of New Jersey at a handsome salary. We have an educational booth at the electrical show in New York, and the wife of one of the company's employees who had secured certificate came into the booth and pointing to a certificate said she had her husband's framed and hanging beside their marriage certificate. And by the way, that man has received a substantial increase in salary. That helps some.

Mr. Mullen:—I am very much interested in that part of your paper which deals with educational work. I am associated with Prof. Ashe who has charge of the educational work at Harrison for the General Electric Company.

I have here a syllabus which outlines a "Short Course for Practical Commercial Men" giving a good idea of the work we are carrying on. We have two distinct courses at Harrison: one course is for the college graduate or technical man, and trains the men for both factory and commercial fields; the other course is for either technical or non-technical men and trains the men for the commercial field only. The work is now in its third year, and it has been most successful.

As Prof. Ashe is unable to attend the convention, I will try to answer any questions you might care to ask. Should any of you be in the near vicinity of Harrison, and are interested enough to come in and see us, we will be very glad to show you what we are doing.

Mr. Stevens. There is one question I should like to ask the gentlemen from New York. I understood him to say that one of the difficulties he had was in finding a place for a man after he had taken him by education from the $1000 to the $2000-a-year class. I want him to tell us how it affects the standing of a man if he gets less than the required 75 per cent. rating and continues to do so; that is to say, if he doesn't show a proper interest.

Mr. Henderschott. That is one of the problems that we have not yet finally determined. We had a few men we rated as class D——men who didn't send in their examination papers. I think there were something like 16 in the department. Four of them have resigned. The others are sort of sweating blood at this time. It is pretty hard to tell where they will come out. Two of them got hold of me yesterday to find out where they stood. I could not give them much satisfaction. The question of their standing has not been determined. They gave me a story that was pathetic. They have all re-enrolled and hope to get through this year.

I think perhaps I left open a question there in my paper. Out of 229, 27 failed and 77 were granted certificates—really 82, because a few have been able to make up a paper or two since. The balance were not able, owing to the demands of business, to graduate, and they will make up the rest of the papers this year and probably graduate.

Mr. Price (New Bedford.) There is one question in connection with this welfare work, which we have taken up in New Bedford, too, and that is how far the company should go in doing things for the men that ordinarily the men might be expected to do for themselves. I have seen discussions and papers on this subject, and there seems to be an agreement on the part of a good many people that whatever the company does for them is taken by the men as something that belongs to them, that all they can get out of the company is so much in, and that the company which does not do three-fourths or seven-eighths of the work doesn't do its part. I should like to know how that has been met by the writer of the paper. It is a little indefinite on the last page but one, as I recall, as to how much that company did.

Mr. Nichols. Our Companies do not assume the attitude indicated by Mr. Price in his discussion of this important subject and particularly of what the employees expect. Their expectations are not an element which determines our course. We, of course, use a policy based upon past experience and the knowledge of the requirements of the unit both individually and collectively in relation to our organization, and then proceed to put it into force.

We have never experienced any difficulty in creating enthusiasm for the Club idea among our men. Invariably, at our Club meetings, we obtain attendance of 50% of our employees. This is fairly high when consideration is given to the fact that a number of our men are on duty at the time of the meetings..

As I have outlined in the paper read, we consider that if we supply a reading room, trade magazines and books, the study of which should be conducive to a greater knowledge of the business; if we arrange an educational course towards this end, the employee is not worth his salt if he does not take advantage of this opportunity. We do not consider that this work is philanthropic and do not approach it other than from the standpoint of a need essential and conducive to efficiency.

We do not believe that the Company should pay the subscriptions of an employee, either to trade magazines or Associations. This is something that concerns the individual and should spring from his ambition.

AFTERNOON SESSION, OCT. 15.

The President called the convention to order at 2.30 and said:

We come this afternoon to the second paper on our program. "Electric Protective Devices," by C. C. Badeau. I am sorry to be obliged to announce that Mr. Badeau is extremely ill and cannot be here this afternoon. His paper will be read by Mr. Burnham.

ELECTRIC PROTECTIVE DEVICES.

By C. C. Badeau.

In the beginning I wish to say it is almost necessary for an author to approach his subject in one of two ways, or a combination of these ways, *i. e.*, either to take the attitude of the professor and his pupils, in which the professor must assume that his knowledge of his subject is vastly greater than that of his pupils, and that his object is to impart information to those under him, or the attitude of the seeker (not the teacher) whose object is to present certain facts and descriptions of apparatus which have come to his knowledge, with the intent of provoking a discussion of this apparatus from a many-angled point of view. It is this second attitude—that of the seeker—which the speaker has tried to take.

For the purpose of this talk, all electric machinery will be divided into five general classes:—

1st. Apparatus for the generation of electricity, including generators, prime movers, etc.

2d. Apparatus for the transformation of electricity from one voltage to another, or from one kind of current to another, such as motor-generator sets, transformers, mercury-arc rectifiers, etc.

3d. Apparatus for the utilization of electricity, such as lamps, motors, heating devices, etc.

4th. Apparatus for the control of the electric current supplied by and to these various classes, such as rheostats, controllers, etc.

5th. Apparatus for the protection of the various classes of apparatus enumerated.

My paper deals with the fifth class only, *i. e.*, devices for the protection of apparatus generating, transforming or utilizing electricity, and does not touch at all that large class of apparatus comprised under the fourth head, such as controllers, rheostats, etc., which are used not for the protection of apparatus, but for the control of the utilized current.

Protective devices may be divided into circuit breakers, oil switches, relays and protective systems, of which relays, switches and circuit breakers form a part. Some of the detail characteristics of each one of these classes of devices will be described in connection with the lantern slides which I will present at the end of the lecture.

Contrary to the general impression regarding protective devices, their main use is not to open the circuit but to keep the circuit closed, except in such cases that opening is absolutely necessary in order to prevent immediate destruction of the protective apparatus, and when such opening is necessary the device should only open the circuit which is affected.

I wish to emphasize this point very strongly, as I believe the fallacy that the function of a protective device is to open the circuit on any and all occasions is the basis of a great deal of false design and poor operation. If electric machinery would stand overloads and short-circuits, the protective device would only be necessary for the protection of cables. The electric station is in the business of selling current, and anything which tends to interrupt the continuity of service tends to not only cut the earning capacity of the company, but also to irritate the customer, and it is only because the enormous energies which we are called upon to handle will produce disastrous results on short-circuits or other abnormal condition that protective devices are needed.

I WISH TO STATE AGAIN THIS FUNDAMENTAL FACT WHICH SHOULD BE BORNE IN MIND, THAT THE PROTECTIVE DEVICE SHOULD NOT OPEN EXCEPT IN CASES OF DIRE EMERGENCY, AND THAT EVEN THEN IT MAY BE BETTER SOMETIMES NOT TO OPEN THE CIRCUIT.

In the beginning, it must be clearly fixed in the mind that all protective apparatus, such as switches, circuits breakers and relays, are used between or in connection with at least two of the classes of apparatus mentioned in the first part of my paper, that is, an automatic circuit breaker, if used to protect a generator or the load, is between the generator and its load; if it is on a transmission system, it is between the transformer and the generator, or the transformer and the load. This fact must be considered in selecting the proper protective devices, in accounting for their action, and in designing the same, and the protective device must take into account the characteristics of all of the various classes of apparatus which affect it and which it in turn affects. For instance, the design of a motor circuit breaker and its operation is not only affected by the characteristics of the motor, its size, etc., but is also affected and affected very largely and to a material extent by the size of the plant back of it and the kind of generators used in the station, and in fact, is affected by anything which tends to change the amount or kind of current or its characteristics. So that a circuit breaker which is suitable for use with a 5-horse-power motor on a 1000 kilowatt plant may not be suitable for use with exactly the same motor in such a location that the energy of a large plant may be pumped into it on a short-circuit, and a circuit breaker which is satisfactory for use on a 15,000 kilowatt plant when placed at a sub-station five miles away from the generating station, may not be satisfactory for use on the same plant when placed in the generating station. It is this fact which makes the design of the protective device so varied and which renders it necessary to obtain full information regarding the conditions before the proper protective device can be recommended.

Since the protective device is the link between the various classes of apparatus generating, transforming, utilizing and controlling electricity, it follows that the successful operation of the station depends on the sucessful operation of the protective device, and that even after the general system of protection has been once determined, it is necessary to have devices whose details have been carefully worked out and whose principles are right, and I shall endeavor in this paper to give the user of these devices some of the principles which I believe are necessary to the production of any good electric protective device.

The first function which every device of this character has to fulfill is that of carrying the current, whether it is a carbon-break circuit breaker or an oil switch, whether it is used for the protection of a one-half horse-power motor or a 15,000 kilowatt generator. It is always and invariably used in series with the device it protects, and, therefore, is called upon to carry the same current which the consuming, translating or controlling device utilizes, and it is called upon to carry this current just as continously as does the device it protects. All circuit-protecting devices, therefore, must necessarily be designed in reference to their continuous current-carrying capacity. In this respect there should be a broad line of demarkation drawn between protective devices and controlling devices, as controlling devices, are only used intermittently during the starting period, and, therefore, are only called upon to carry the current passing through them for a short space of time. Circuit-breaking and current-carrying contacts which have proved themselves eminently satisfactory for controlling apparatus, are not always or usually satisfactory for circuit protective apparatus, and the failure of more than one class of circuit protective apparatus can be traced to the fact that an attempt has been made to employ controller contacts in these devices.

Of course, for carrying the current continuously there is nothing that is more satisfactory in the way of a joint than a well-soldered joint; next to that comes a heavily-bolted joint, and a close third, a laminated joint. This is followed by blade contacts. clip contacts, butt contacts, etc., these being mentioned in the order of their efficiency as current-carrying members. As it is necessary to use a joint which can be easily closed and opened, the bolted and soldered joints, although ideal from a standpoint of current-carrying capacity, are impracticable on switching or circuit-breaking devices. The laminated brush, on the contrary, possesses the features not only of being able to make and maintain a good contact, but can be easily removed from the contact to open the circuit, and when rightly made and used, is the best current-carrying member employed, either on carbon-break circuit breakers or oil switches; in fact, its use has become universal on carbon-break circuit breakers to the absolute exclusion of all other forms of contact, and there is no reason why its use should not become just as universal in oil switches.

The Company with which I am connected, has used the laminated brush for years on its oil switches and believes that it is the only practical current-carrying member for use on such switches.

In any event, whatever kind of contact is used, the purchaser should insist that his contact be of sufficient carrying-capacity to take care of the full load current of the switch with a rise not exceeding 25 or 30 degrees C. A higher rise than this is not only dangerous because it limits the over-load capacity of the circuit-breaking device, but also because it heats the oil, and experiments seem to show heated oil is not nearly so effective as cool oil in quenching an arc.

I emphasize the importance of the contacts on oil switches because due to the fact that the contacts on such switches are hidden by means of the oil can, and that the oil can has a considerable radiating capacity, and the oil itself is a good heat-carrying member. Some oil switches have in the past been provided with contacts which were not adequate for their service.

The oil should not be depended upon to take care of a poor contact. The contact on an oil switch should be just as capable of taking care of its full-load current without overheating the oil as a similar contact on an air switch. It is extremely poor policy and short-sighted buying to purchase for 200 ampere service a switch which would be rated at 100 amperes in air, but when put in oil is rated at 200 amperes, because of the radiating surface of the oil can.

Under this same head of current-carrying members come such details as proper terminal connections, proper size studs, etc., and as all of these points are determined by the heat, a moderate temperature rise at full-load current with no oil in the oil tank, if insisted upon by purchasers, will do much to correct some of the faulty design which is now prevalent in the oil-switch field. Purchasers should specify both the rise at the contacts and the rise at the terminals, so that a poor or inefficient contact with a large rise cannot be hidden by using heavy terminals.

After having selected a circuit-breaking device which has sufficient and ample current-carrying capacity, it is also necessary to have a circuit-breaking device which will satisfactorily interrupt the energy which it may be called upon to handle.

Volumes could be written on methods of opening electric circuits without destroying the opening device. The subject is still more or less in its infancy. Various theories have been and are continually being propounded, and the prospective purchaser and user is apt to be confused by glib talk of oscillograms, tests, baffle plates, oil blasts, etc., which rival concerns in this class of apparatus are continually harping upon. There is no doubt but what some of these schemes have improved the breaking capacity of the switches, although this point still remains to be proven in many instances; but there are a few clear and fundamental rules which can be laid down which should serve as a guide in selecting the proper circuit-breaking device, considered as a device for breaking the current only and not for carrying the current.

As regards carbon-break circuit breakers for direct current, it seems pretty well proven that if the carbons are of ample size, and if the resistance of the carbons is low at the instant of break (not when the breaker is closed) and if the break is wide enough, that such circuit breaker when properly mounted will open any short-circuit which may be put upon it satisfactorily.

For alternating-current circuits, however carbon-break circuit breakers are eminently unsatisfactory, even on low-voltage installations, as long. flaring arcs, in part due to the discharge of the circuit, not only burn the circuit breaker unreasonably, but also the sudden breaking of these arcs at the maximum point of the wave causes a disastrous rise in voltage; this rise in voltage being so much as sometimes to break down the insulation and start a fire. The oil switch, on the contrary, not only breaks the arc in a bath of oil, which prevents any severe burning of the contacts, but also tends to break the arc at the zero point of the wave, thus interrupting the circuit with the minimum disturbance and rise in voltage. When oil-circuit breakers are provided with the proper form of contact for carrying the current, there is no excuse for the use of carbon-break circuit breakers on either high or low amperage capacities, alternating current, whether the voltage be 100,000 or 100, the oil switch being in most cases cheaper and in all cases more satisfactory, and when trouble has been experienced with oil switches on heavy ampere capacity work, it is generally due to the selection of the wrong form of contact.

When the oil switch is used, however, in central stations where there is an enormous amount of energy back of the switch, the problem of interrupting the circuit becomes difficult, and cases of every type of oil switch blowing up at some time or other are well known. It seems however, that other things being equal, the oil switch which has the strongest mechanical structure, the strongest oil tank and the greatest head of oil over the break at the instant of break will open the most energy. These are points which can easily be determined by an inspection of the switch, and if the oil tank is weak, either integrally or in its method of fastening to the main frame, or if the break starts too near the surface of the oil, no matter how deep it pulls into the oil afterwards, it greatly reduces its rupturing capacity.

Most of the tests made on heavy short-circuits so far, while of value to the manufacturers in showing them the weak points of their design and enabling them to correct these weak points, are not of much value to the purchaser in determining the relative merits of various types of oil switches, as from an examination of these tests it seems that the short-circuits have so far been either of such a high or such a low power-factor that they were not as severe on a switch as actual service. In fact, certain switches which stood up extremely well under very heavy short-circuit tests recently failed completely the same week on a very much smaller short-circuit in a central station.

In general, the best test is the test of service, and if switches have satisfactorily been used for years on stations with a heavy kilowatt capacity back of them, this should be given due weight.

It is not always expedient or even the best policy to purchase circuit-breaking devices which can be absolutely depended upon to break an extremely heavy short-circuit, as the cost of real estate in some situations would render such an installation prohibitive, and as the possibility of these extremely heavy short-circuits may be exceedingly remote; but nowhere is economy so false as when applied to the purchasing of protective devices, and in no other class of apparatus should price be given as little consideration. The price of even the best and most expensive of these devices is almost nothing compared with the cost of the apparatus which they protect, and a few dollars saved on these devices may not only wreck the station apparatus, but throw an entire section of the city into darkness.

Non-automatic, circuit-protective devices or switches, as their name implies, are not affected by any automatic or abnormal conditions of the circuit which they control, but are simply opened and closed by hand. They are used where it is necessary to provide a means of readily, safely and easily interrupting the circuit at will.

Automatic protective devices operate when an abnormal or pre-determined condition of the circuit occurs. This condition may be an overload, underload, over-voltage, under-voltage, reverse current, etc., and the operation of the circuit breaker may be instantaneous or its action may be delayed, either for a pre-determined time or for a time which is dependent on the strength of the abnormal condition of the circuit.

Controlling the action of the various kinds of oil switches and circuit breakers are devices known as relays, whose function is to cause the switch to open at any pre-determined point or condition of the circuit. An entire evening might be profitably spent in the discussion of any one of the various types of relays, such as time limit, reverse current, etc., but I will only endeavor to give a few principles which will govern the selection of relays.

In the first place, let me emphasize again what I have already said,—the relay should be selected, not only with the view of protecting apparatus, but of maintaining the service, and that the circuit should only be opened when it is necessary to do so in order to prevent the apparatus from being destroyed and the line from being shut down altogether.

Much vague talk about curves of relays and their operating points, etc., becomes clear when it is kept in mind that the primary object of a relay is not to open the circuit, but to keep the circuit closed except in cases of extreme emergency, and that it is only the inability of our generating and transforming apparatus and cables to stand continuous short-circuits, which rendered it necessary to use the relay at all, as, if our apparatus would stand these short-circuits, relays and automatic circuit-breaking devices would be relegated to the limbo of lost devices.

In general, the protective systems which include relays can be divided into two classes: First, that which uses pilot wires or an auxiliary transmission system so arranged and balanced that disturbances in the main line are reflected in the auxiliary line, and these disturbances operate the proper kind of relays; this is usually used with ring systems and is commonly known as the Mertz-Price System. Second, the system of protection commonly used with radial or parallel distribution, which consists of relays either reverse or straight overload which are set to act selectively, *i. e.*, in a certain pre-determined order. These relays are almost invariably damped. When so damped, it is necessary that the damping element or the arrangement which produced the delayed action, be so arranged that no matter how heavy or severe the short-circuit, the selective action of the relays will not be disturbed, this being essential in order to maintain continuity of service, for if the relays on a heavy short-circuit operate simultaneously, no matter what their original time setting was, a heavy short-circuit on a small customer's premises may shut down the entire line reaching through the various sub-stations, clear back to the generating station, and such shut-down may be extremely disastrous.

The relay which I will describe later possesses this time-selective feature, and this feature is one that should be insisted upon in the purchase of time-limit relays.

The damping element or device which is used on time-limit relays should also be the subject of very close scrutiny, as it is on the relay that the entire protection of the transmission system depends, and the reliability of the time-limit relay depends on the operation of this damping element. Damping elements which are likely to harden, to change in time, or be affected by moisture, temperature or short-circuits, are unsatisfactory.

This whole subject again contains enough for an entire paper, but I can only touch on it as given above in a general and fragmentary manner.

I have lantern slides which show some of the classes of apparatus mentioned above which I will briefly describe, and I trust we may then have an animated discussion and will be very glad to answer any questions that arise in so far as I am able.

THE PRESIDENT. Mr. Burnham has a few slides of different protective devices, which he would like to show us.

MR. BURNHAM (showing lantern slides.) This first slide shows an oil switch, 300 amperes, 15,000 volts. The particular feature of it is the removal of the switch units. Each one is a unit of itself. The disconnecting switches are arranged in the cell at the top of the switch and are a part of it. There are no barriers shown here, so that the construction of the switch can be seen. As a general rule, barriers are used in between the three poles of the switches. Although it shows a four-point bearing on these switches, it has recently been changed to three points to get more stability. In that way absolute alignment is assured when the switches go into the cells, consequently, any pole of any switch of this type may be very easily taken from the one-cell, or a spare switch and put into a cell where it is needed. To take this switch from the cell, it is only necessary to open these disconnecting switches with the switch-hook. In doing that we have disconnected the circuit entirely from the switch and by a few turns of the bolt here the switch may be taken out of the cell and another unit put back in its place.

Two magnets are used to close the switch in order to eliminate as much as possible the inductive discharge from the coils. The shaft passes through between the two magnet frames, a cam being arranged on the end of each armature, and when the magnets are energized the armature simply pushes the arms in and sets the brushes. The greatest power is attained when the armatures are close to the magnet, and in that way a great deal of force is obtained at the time contact is made.

This is an up-break switch. The break is made at the bottom of the tank under approximately 19 inches of oil. There is an air space or gas dome at the top of the switch which allows for the expansion of gases. The tanks are quarter inch thick and electrically welded. There are no rivets or holes anywhere.

This is a control switch used in connection with the electrically operated switch previously shown. It is simply a single pole, double break, double throw switch. The handle is always in mid position. In throwing the handle to the right, the movable contacts bridge the stationary one which energizes the contactor in the usual way, thus closing the main switch. The lamp is then lighted from the control switch on the oil switch, and the handle goes into mid position and always remain that way unless moved by the operator.

To open the switch, the handle is thrown in the reverse direction, which energizes the opening magnet shown on the other slide and trips the switch open. This control switch is also provided with an automatic release from the handle, which is used in automatic oil switches; that is, this handle is disengaged in this manner; a small magnet is energized by the relays on short circuit or overload. The armature simply rises and unlocks the moving contact from the handle, allowing it to trip the oil switch. When the oil switch trips, the circuit of the opening magnet of the oil switch is opened also by the control lamp switch.

The same thing is true in closing the switch at time of overload or short circuit. When the handle moves to the right across the closing side, the armature will move up in the same manner and disengage the contact from the handle and by means of a spring, the circuit of the closing magnet is opened and the circuit opening magnet is closed. It is absolutely impossible to get any condition wherein a switch controlled in this manner will pump on the short circuit. The control contact must be in closing, opening or neutral position and can never be in two places at the same time.

That switch has a rupturing capacity of 40,000 K. V. A. This switch shows the internal construction of upbreak switches. There is a two-piece brush used in this manner. This divides the arc into four parts, breaking at the bottom of the oil tank with approximately 11 inches of oil over it. This is an oil deflector put in there for the purpose of preventing the oil from being thrown out of the tanks on heavy shorts or overloads, and it is arranged so that there is about a quarter inch space between it and the lining of the can which allows the oil to ooze out, so to speak, around the sides of the oil plate, and also causes a little more pressure on the oil than would otherwise be the case.

The oil line is about four inches from the top of the tank, and allows sufficient space at the top, above the oil, to allow the gases to expand freely without creating too much pressure in the oil tank.

I want to call particular attention to the fastening of these tanks. There are heavy ribs around the edges of the switch frame. The ribs make a strong support for the tanks which are fastened at the bottom and at the top. This seems to be better construction than simply fastening the tanks at the top.

The control magnet is somewhat as shown in the other switch. I want to call attention to the simplicity of the mechanism. The switch is shown in closed position. It is absolutely clear on the top—no mechanism in close proximity to the terminals.

This switch is used in connection with the control switch I previously described, this being the closing magnet, a single one only being required on this size of switch, the automatic feature being in the control switch. The rupturing capacity of that switch is in the neighborhood of 20,000 K.V.A. The test voltage is 45,000 volts. The temperature rises 30 degrees C.—15,000 volts working pressure.

This is a so-called non-closing switch on overload. That is not so, of course, because you can't get an overload until the switches are closed. This shows a carbon-break circuit breaker, two poles, independent closing arms and mechanical interlocking between the poles, so that an overload on either pole will trip both breakers.

Here is a laminated brush. Laminated brushes in the past have been made up in many different ways. The laminated brush used in these switches is made different from any other type of brush of that character. Each one of these laminae is bent in a cam-operated die, each one being bent at a different length and a different angle, so that when that brush is pressed up against the contact block, there is a space around each of these laminae. That allows free ventilation and also allows oil to pass around each laminae, and, furthermore, if there is a space between the different laminae, then every laminae in the brush makes contact.

This shows the type of carbon employed on the carbon break breaker, the lamination brush, the metal auxiliary and the carbon contact. These carbons are so arranged that when the breaker is closed they have greater resistance than when the breaker is opening. The carbon discs are set ahead in this manner in order to have the lowest possible resistance when this auxiliary here leaves the breaker. I mean by that that at the moment the auxiliary leaves the contact block, these carbons coincide, so that the greatest surface is presented to one another and the current is shunted from the auxiliary here, up through this block until the contacts have full face surface; then, as the breaker opens, there is at all times a resistance gradually introduced into the circuit and all the time the current is gradually dropping in the circuit, so that when this moving carbon contact leaves the stationary carbon contact, there is much less amount of current in the circuit than if the breaker had opened as in the flat horizontal type of carbon.

This is an oscillogram showing the amount of current a small breaker will open. This is a 200 ampere breaker and the breaker opened 7,520 amperes, showing practically no rise in voltage, and it was necessary that the breaker should open three times in succession and go back and carry its rated current.

Here is a small switch for 600 volt work. Automatic overload. One hundred ampere, 600 volts. Rupturing capacity 3000 K. V. A. This shows the interior view of the switch, showing the contacts breaking at the bottom of the oil tank. Heavy, galvanized iron cans are used, with wooden lining. Note the heavy auxiliary contacts here and the simplicity of the mechanism.

This shows the same type of switch enclosed. These are absolutely tight, so that there is no necessity of closing the whole top of the switch.

This shows the interior of a very inexpensive switch for which there seems to be a demand. That is an oil switch which is entirely enclosed and which may be used in connection with a one or two horse power motor. The price of this would be commensurate with the price of the motor. There are many cases where one wishes to use an oil switch in connection with a small motor and sometimes one has to pay more for the switch than the motor. This is really a big socket, and has a 2¼ inch break, breaking at the bottom of the oil can. It is entirely enclosed. It may be automatic or non-automatic, and only has a rupturing capacity of 400 or 500 K.V.A.

This is another type of carbon break breaker, showing a pull-down handle instead of a push-up handle. It is 1000 amperes capacity.

Here is a D.C. breaker, a very inexpensive type for use with a small motor where you don't want to bother with fuses. It gives the same protection as the larger types, though designed on a smaller scale.

This is a type of switch used for opening very heavy energizes on alternating current circuits. There are two separate and distinct members in this switch; that is, there is a current carrying member, which is made up of laminated brushes, near the top of the oil. The oil line comes about four inches from the top of the brushes. The brush holder is made in a yoke form, and at the end of the yoke are rods extending to the bottom of the oil tank. These are the auxiliary contacts. The current is carried in this manner.

This is a two thousand ampere breaker, each side of which carries 1000 amperes, using multiple stud system construction. The current travels down through the two studs across the brushes and out through the other terminal, this being a single pole switch.

When the switch opens, the brush is shunted by very heavy auxiliary contacts at the bottom of the tank. As this brush moves upward approximately 1½ inches, these contacts are just leaving and consequently the current is shunted down through them to the bottom of the tank.

Now there is provided for a current carrying member, the laminated brush. The laminated brush is not a good current breaking member. It is not designed for that purpose. It is the best form of contact to use for carrying current but not for breaking. The heavy auxiliaries shunting the brush are used for that purpose. For instance, take a candle flame and put a small piece of iron wire and in a few minutes it will burn up. But put in a ten penny nail and you will find that it has surface enough to radiate the heat without an appreciable increase in temperature. The same thing applies in connection with a brush in an electric arc. The auxiliary contact must be massive and have a lot of radiating surface. It must be of such size that it will absorb the heat and not burn excessively. These contacts weigh approximately 12 pounds each and are of sufficient mass and proper design to dissipate the heat of an ordinary short circuit on a large system. It is so arranged that the greatest amount of oil is over the contact at the moment of breaking—approximately 21 inches. At the top of the tank is a gas dome as shown in the other switches. The switch is designed for 15,000 volts, stands a 45,000 volt test without any oil in the tank, and carries its rated current of 2000 amperes with a temperature rise of 30 degrees without oil in the tank. The current carrying member is not in the air. It is in the oil. And if, for any reason, trouble should occur to the auxiliary contacts, so that they failed to open the circuits properly, or were damaged so that the resistance of the auxiliary circuit was very high, we would not be called upon to open that heavy current in what we might call air. There is sufficient oil over that brush, so that should anything happen to the auxiliary contacts it would open the circuit. The current carrying members are all supported from the top of the tank. When the switch is removed from the tank, it may be set on the floor, the contacts may be adjusted and put back into the switch without any marks on the outside to show how the contacts are.

This is a 5000 ampere carbon break breaker. It has no feature of particular importance outside standard construction.

This illustrates a double-pole breaker, with reverse current attachment. It consists of simply a laminated core, with a current coil making say the north pole on one end and the south on the other. This is a potential coil, pivoted at the center and can only turn one way. When the current is reversed, the polarity simply reverses in the laminated core and thus trips the breaker mechanically.

This is a Nopotrol switch for use in series street lighting, where it is sometimes required to throw a tungsten multiple light on, at the same time series lamps are lighted. This is a small oil switch of 10,000 volts test, capable of opening 15 amperes, 2500 volts, or can be used in much higher current carrying capacity on lower voltage.

As there is more or less flickering in arc circuits, there has been some trouble with ordinary solenoid switches. Every time the arc circuit flashed, the multiple lamps would simultaneously flicker. It is obviated in this type of construction. This core is made of a special piece of steel. When the current passes through it becomes magnetized, permanently, and will stay that way four or five days. Now as the arc circuit fluctuates, this will not move to allow the tungsten lamps to flicker as with the other type. The problem now is how to open the multiple circuit. Simply pass .4 of an ampere alternating current through the arc circuit which demagnetizes the core and allows it to drop down. So you have absolute control of the tungsten lamp without any additional wires, time clocks or patrolmen.

This is a standard oil switch with special face plate so that in case of low voltage the service will be disconnected from one service and thrown onto another source of power. It is called an emergency switch.

This illustrates a manhole switch shown with separate cables. It is also made for three-core cables. It is absolutely water tight. This little plug doesn't seem to be anything. But you can't open a heavy inductive circuit in a closed space. It would not be safe to open it with that closed up. Instead of running the vent pipe for the gas up into the street, the handle simply opens here and vents the switch, and the same handle is used to operate the oil switch on the inside. So that we get rid of the vent pipe and the gas absolutely, because the vent has to be open before the switch can be opened. Those switches are tested in a tank filled with water and left over night for waterproof qualities and is considered a fairly good test.

I call your attention to the method of insulating the terminals on the inside of this switch. It has been found from experience that small static discharges from the lines many times cause current to jump from terminal to frame inside the pole line switch. In putting these porcelain cups over and closing everything up on the inside, we are able to control this leakage to a certain extent. The pole line switches are all like that, leads being furnished so that the lineman does not have to open joints inside the switch, or make any connections. It is only necessary to skin the wire here and make connections to it.

This is a 44,000 volt oil switch, 88,000 volt test, 300 amperes. About 50,000 K.V.A. I want to call attention to the smooth insulator. As a general rule we find electric concerns using corrugated insulator. It is all right in some cases. But in high tension service it is better to have a switch that can be cleaned easily, and not one full of corrugations for dirt to rest in. You can get much better porcelain without corrugations. It is more homogeneous.

Here is shown a type of the disconnecting switch. The frame work is mounted on a marble base. I call attention to the double blade construction. We have a lock to prevent its being blown open by the magnetic effect of heavy currents. To open this it is only necessary to put the switch hook in and pull down.

This shows a carbon break breaker for 1200 volt work. It is a three-pole carbon break breaker, provided with A.C. one no-voltage release. I call attention to this low voltage release. It is made of cast iron, contrary to what almost everybody would use for that class of work. The reason that cast iron can be used is that the flux density is very low and the hysteresis and eddy current losses are very small. The armature is very heavy, but is arranged in a perpendicular plane, and all that it is necessary for the coil to do is to hold the armature vertically, supplying only the horizontal component. The weight of the armature is held on this pin. It is absolutely dust proof and moist proof, though not exactly water proof and up to 600 volts all of the windings are put inside of the coil. There is no external resistance with them.

This shows a carbon break breaker, equipped with a time limit attachment. It is simply a vacuum dash pot which retards the action of the plunger. You get about 12 seconds on full load, and it drops down to five seconds on 130 per cent full load. At 300 per cent full load it trips instantaneously.

This is a selective relay. The armature is mounted in ball bearings, and a thread is cut on the end of the shaft so that when the relay starts to operate it turns a worm gear around and closes the contact.

This illustrates roughly the electrical connections of the relay. L represents the line and the current transformer is represented by C. The coil around the magnetic circuit is shown as one here, although in a relay there are two, connected in multiple. The transformer circuit is simply passed through that field coil. You will note that there is no electrical connection from the field coil through the armature. Many have an idea that the relay is designed so that the armature is in the current transformer circuit. The field frame is hinged in the middle, and normally is nothing more than an electro-magnet with armature. Let us suppose that enough current passes through coil 11 to close the air gap. You will now note that the armature circuit is closed. That is, we have short circuited the brushes on the armature. The electric magnet is now transformed into a repulsion motor. The characteristics of the repulsion motor are like the series motor. That is, as the current increases in the field coil (11), the induced current in the armature will also increase, and the speed of the armature will depend upon the relative currents in the armature and in the field coil (11.) That means, the greater the amount of current the faster the armature is going to revolve, and as long as there is a definite space which the contacts have to move through, then the time will be inverse to the amount of current; that is, the greater the current the less the time, and the less the current the greater the time. It is a very easy matter to get this part of the curve here with various types of magnets, etc., but for selective operation you want a relay the curves of which never intersect, and the only way I know that that can be accomplished is by having a curve which is a combination of an inverse curve at the beginning and a definite curve at the end, with a varying travel of the contacts. Now, to get this definite part is where the trouble comes in. Previous relays have a curve which, starting down here, on short circuit will cross down here, no matter how widely apart they may be set at the beginning. With this type of relay, if the winding is so proportioned to the iron that saturation takes place at about the time we want this curve to start definite, it may be accomplished. We have then all the flux we can get into that iron and it doesn't make any difference how much current flows through coil 11, the flux is not any greater and the armature can't run any faster, so that the time of the operation will be constant from about three to five times full load.

This is a cross section of the relay, which will give you an idea of its construction. Here is the armature. The field coils are shown here with the air gap at 3. The bottom of the field coil is hinged at 6. Now, looking at it from an ordinary electro-magnetic standpoint, it is simply a field coil here and a field coil there, and an armature here, which is half of the field coil. This is the compression spring holding the armature down until such time as the current may cause this to close this air gap. When that is done, the armature is short circuited, and then this contact iron will travel up here and touch that contact at 30 and trip out the switch. It is worked the other way also from a circuit opening trip. To change the time and get different curves, all that is necessary is to unscrew 23, and this arm is capable of being rotated on that shaft without the gear rotating, so that one can move this into another position and the difference in time will be the difference in the two positions of the arm.

This shows the inverse portion of the curve here and the definite curve here. One. two, three, four are curves taken at different positions of the contact arm on the relay. The curve shows 100 amperes passed through the winding of the relay, and the time is absolutely not changed from 15 amperes to 100 amperes. That may seem like a great deal of current, but take generators with very low induction and heavy shorts near the station, it is not at all unreasonable.

This shows another type of curve. The maximum time is only two seconds on this curve, and it drops off slowly until at 60 amperes, the time is 1¼ seconds. That is the character of the curve used in many central stations with selective operation. We want short time at the beginning, and we want this last part here as small as we can get it with selective action, because 1½ or possibly two seconds is entirely too long a time for plants of 100,000 kilowatts, especially where turbo-generators are used. Now, if you have a relay you can set within a quarter or half a second on radial distribution—with selective or discriminating relays you can, and very nicely, take care of the disturbance and be reasonably sure that the relays will act selective, even though the setting is apparently very close; that is, half a second or a quarter of a second. With extreme accuracy in the relay it reduces the maximum time at the generating station, and is very important.

Figure 7 will give you an idea of the accuracy of this class of relay. On the left hand side, marked "8", "11½", "15", etc., it shows the current which passed through the relay coil. Here is shown the number of times of the operation. This column indicates the average time, this column gives the maximum variation in seconds, and this the inverse and this the definite part of the curve. Take this 8 ampere point, for instance. The first operation was 2.47 seconds, the next 2.55, 2.50, 2.43. 2.50. The average was 2.45 seconds, and the maximum variation .19 of a second. Take 20 amperes, for instance. In that case the time is 1.16, 1.13. 1.15, 1.16. average time 1.17, and maximum variation only .092. That has more or less the same characteristic as a meter. That is, its accuracy is very great at full load and of course not as great at light load, and friction error is almost negligible at light load and disappears at overloads.

THE PRESIDENT. This is a very interesting paper and we ought to have a good discussion.

MR. IRA M. CUSHING. Mr. Knight was asked to make some notes, but as he is not able to be present, I will read his notes and then give you a few ideas of my own. Mr. Knight says:

"This paper has its chief interest to me in that it is a general resumé of what are stated to be the fundamentals of the design and selection of protective devices. Many of the points brought out by the author have been advocated by all large manufacturing companies for years, and, therefore, are recognized as old friends and axioms of long standing. As of greatest importance in this discussion the author brings out early in his paper the fact that protective devices should only operate in case of dire emergency. This sounds ominous, yet it is perfectly true for many conditions—by no means for all. It must be agreed, however, that this specification is of great importance and deserves the emphasis employed in the statement of it in heavy type (see page 4.) However, we question the addition of the last clause in this statement in this connection. It seems to me that this clause takes the whole argument out of the field of the practical since a condition governed by "a sometimes not" is one that no well designed relay can meet.

I believe that all will subscribe pretty generally to what the author has to say in regard to design and selection of oil switches. However, we cannot admit of the instance of any broad line of demarcation between brush contacts and other types, the most important of which are the so-called "finger type." The General Electric Company has used both types for years and is fully convinced that there are broad fields for both types. The many thousands of switches in the field today with finger contacts and giving the best of service rather tend to invalidate the author's statement that the brush is the only practical current carrying device.

The author—rather surprisingly it seems to me—makes several rather slurring references to "test data" during the course of his paper. His remarks regarding glib talk, tests, oil, etc., are also interesting in this connection. Yet how can we arrive at the clear fundamental facts laid down by the author without recourse to our test data? How are we to know that the circuit opens on the zero point without looking to the oscillograph? How can we improve our design without intelligent use of baffles, or how can we make any progress without experimenting on untried devices? In coming back finally to the subject of protective devices proper the author again repeats the old axiom. But to take care of all conditions leaves us nothing to choose from but the Mertz-Price system or such a device as described to-day. There are a great many systems of protection, some very satisfactory and covering certain conditions. No two devices or systems will take care of all conditions, however. There are many situations still to be taken care of and for the most of these there is a suitable device or system to fulfill all reasonable requirements. In connection with the Mertz-Price system, it may be of interest to know that there is available to-day in this country a relay of the pilot wire type, which, however, employs a less number of pilot wires, is much less complicated and will cover all conditions that the Mertz-Price system will and with less possibility of trouble, and may be installed and operated without requiring special and expensive current transformers.

So much for Mr. Knight's remarks. Now for my own ideas. I think I ought to take exception to Mr. Badeau's statement that "contrary to the general impression regarding protective devices, their main use is not to open the circuit but to keep it closed." I rather doubt that. I think the principal use of the relay, or any other protective device, is to disconnect from the system a defective part of that system. The machines—generators, transformers, etc., manufactured to-day are built to withstand short circuits; and, in fact, the designers have gone so far as to put as high as 30% regulation in generators, just so that on momentary short circuit they would not give more than 10 or 12 times full load current, just to protect the generator from damage. But the relays and other protective devices are intended to cut off and isolate certain portions of the system which have become disarranged either by short circuit or extremely heavy overload.

The author says also that the protective devices should not open at certain times in order to protect themselves. I think they are rather belying themselves in that case. They are really intended to protect the rest of the system or apparatus, as he mentions later in his paper.

Further along in his paper also he says the protective devices should be capable of opening in any and all conditions of circuit, which does not agree with the previous statement.

As implied in the paper, the design of relays depends upon the system in which they are installed. That is certainly true and I think it is almost impossible to design one relay that will cover all conditions. In fact, I think every system requires a special study as to its protective devices.

Take a large system like the Edison Company. It requires an entirely different type of protective device from some of the small stations where there are only two or three feeders which they are not interconnected in any way. And the lines between stations and sub-stations require a still different type of relay.

It is true, as the author of the paper says, that switches, whether oil or air break, must have sufficient rupturing capacity for the size of the system. That, I should think, would be recognized by all. But I don't quite understand his statement that the motor which operates the switch has something to do with the system on which it is being used. I should rather say the motor should be capable of operating the switch, and that the switch itself should be designed for the system on which it is to be used, and that the motor will follow the design of the switch.

The finger type, the appearance of which Mr. Badeau seems to dislike, has given just as good service as the other type, namely, the laminated joint. Both kinds have been used with success in all types of switches.

Mr. Badeau certainly gives some good advice in regard to the selection of switches for your system. But I sometimes think that the prospective customer is mistaken in trying to hedge the manufacturer around with too many conditions. He must admit that the manufacturer has gone into the subject of switches, etc. much deeper than he has. It is much better for the prospective customer to pick out a manufacturer who is reliable and who has been in the field long enough to know what is needed in the requirements of that customer. And then having picked out the manufacturer talk over with him all the points that affect the installation, and give all the information possible regarding the system, and then let the manufacturer tell what is needed.

I think it is well for the prospective customer to make himself familiar with the reasons why the manufacturer suggests certain things, but I think it is poor policy for him to suggest to the manufacturer that he should have this or should have that. For instance, I notice that in Mr. Badeau's paper: "Purchasers should specify both the rise at the contacts and the rise at the terminals, so that a poor or inefficient contact cannot be hidden by having heavy terminals." While it is true that a poorly designed switch is a bad thing to have on your system. I think you should rely on the manufacturer to see that the switch is properly designed, and I am sure that any manufacturer of repute will make good any imperfect apparatus.

I think also that this matter of rise in temperature is important from the fact that these contacts are down in the oil. I think oil makes rather a poor contact on low voltages. I don't know what Mr. Badeau's limit on voltages is, but my experience is that the contact does not seem to have as good current carrying capacity as in high voltages. I am under the impression that for low voltages you need a larger contact surface per unit of current than on the higher voltages. I believe circuit breakers have given just as good service in that line of work as the oil switches have.

The subject of testing seems also to have been rather poorly thought of by Mr. Badeau. The curves Mr. Badeau showed were made from factory tests rather than in actual conditions, because the central station man does not like to have too much testing going on on his lines.

Further than that, as Mr. Knight brought out, the manufacturer has to make a certain number of tests, but it is perfectly true that we cannot in the manufacturing plants obtain the very best results. Yet we can approximate actual results so closely that when the apparatus is finally put out there are very few points further that can be discovered.

Of course, manufacturers all admit that testing in actual service is by far the best.

I also notice this statement in Mr. Badeau's paper: "In fact, certain switches which stood up extremely well under very heavy short-circuit tests recently failed completely the same week on a very much smaller short-circuit in a central station." That may be perfectly true, but I think it will also be found that the trouble was more a matter of voltage than a matter of actual amperes, and it is possible that something on the system raised the voltage, so that it was an arc-over rather than a breaking down of current carrying parts.

Towards the end of his paper Mr. Badeau mentions this Mertz-Price system as being the best. The great objection to this system is the large number of pilot wires and special current transformers required. This becomes more objectionable in underground systems where duct space is valuable.

Mr. Burnham. Mr. Cushing has referred to Mr. Badeau's statement that even in cases of emergency it may be better sometimes not to open the circuit. Evidently, what the author of the paper had in mind was this: If you have a relay on a system and you get a very heavy surge that only lasts for a fraction of a second, isn't it better to have the switch stay in than to have it open and interrupt service? The point is this. Your apparatus has been subjected to the shock, to the greatest shock, because that current has risen to its peak value in a very short space of time, and your switch could not possibly cut out until the current value had dropped down considerably. Now, in a case like that, where it is only a momentary shock, where everything is all over in the fraction of a second, isn't it much better to have your switch stay in than to shut down your whole station? That is the point Mr. Badeau wished to bring out. From an operating standpoint, the question must be answered in the affirmative. From the standpoint of the apparatus, I don't see that it makes any difference, because your current has risen and dropped in the fraction of a second. Your transformer and generators have been subjected to that shock. What is the use then of opening the switch and shutting the service down? Certainly that would not be true in every case, as he says. But there are cases where it is true, and this instance is one.

Now, regarding the finger and brush contact, I agree with Mr. Cushing that undoubtedly there is a place for each. But as he says, we don't understand why it is that you want to use oil on a low voltage alternating current. He says you need a lot of surface. Now, that is why the laminated brush is used. Take the contact of the finger type, where you have four fingers say on a 300 ampere switch. The best you have got is four lines of contact. That is all. Four line contacts. You may have ten square inches of surface, but when those contacts are mounted on a piece of spring metal and you have a V-shaped piece making contact, you can see that contact is not made over the entire surface. All you have is four lines, and that is equivalent to four leaves in a laminated brush as far as contact is concerned. That seems a logical way of looking at it, of making the comparison between that type of contact and the laminated brush contact. In all probability up to 300 amperes it will carry the current just as well as the laminated brush, but when you get up to 2000 or 3000 amperes alternating current circuits, some of the concerns recommend an air-break breaker. Why? Because you'd have to have a great many of those finger contacts to carry the current. It is a matter of space. The laminated brush gives more points of contact in a given area than any other commercial type of contact. Brushes are laminated horizontally and vertically to get more points of contact, and points of contact must be considered and not apparent contact area.

Now, for breaking current I say the finger contact is fine. But there is no one contact that can perform both functions in every case. A laminated brush to carry the current and a massive auxiliary to break the arc similar to a finger contact is to my mind, the ideal contact not only for large current but small.

Regarding the use of pilot wires, one pilot wire does not make much difference when you are hauling in a cable. You might just as well haul in a five-wire cable as a four. You had better haul in a three-wire cable than a two, to care for emergency. But what you want is the Mertz-Price system without any wires, and such a system has been devised.

R. S. Twitchell. Mr. Badeau's paper and the remarks of Mr. Burnham and Mr. Cushing have covered the subject so thoroughly that there is little left that need be said. I want, however, to ask Mr. Burnham one question: It is so recently that we have come to understand to any extent the action which takes place in the opening of an alternating current circuit that some discussion of the fundamental action will, I think, be of value. I want to ask Mr. Burnham what he means when he says a switch is capable of opening at 20,000 or 40,000 kva. I don't ask that in reference to a particular switch, but so that we may have a definition; *i. e.*, does he mean that these figures represent the rated capacity of the generators connected to the circuit at the time the circuit breaker opens instantaneously on dead short circuit, or the value of the short circuit at the instant that the circuit breaker opens. There is a difference of many hundred per cent in the choice of these definitions.

In his paper, Mr. Badeau referred to the fact that on test the power factor under which the switches were called upon to open was either so much higher or so much lower than that which obtains in practice that the results were not conclusive. I should like to ask on what power factor he bases the ratings spoken of above.

In reference to the requirements to be met in circuit breaker operation there are three things which we would like to accomplish. The first is continuity which, under ideal conditions, would not mean a circuit breaker at all, the circuit under all conditions remaining closed. The second is that it shall open quickly enough so that it will not injure the generating apparatus. And the third is the effect upon the circuit breaker itself. The ideal condition for a circuit breaker is that it shall remain closed long enough so that the short circuit may fall off. Under ordinary conditions the short circuit drops off to about one-third of its original value in the first second. In the second second it may drop to 25 or 20 percent. If the circuit breaker can remain closed for two seconds, it has much less severe work to perform than if it opens earlier. If it opens instantaneously, as we call it, it actually opens in probably about one-tenth of a second, roughly speaking. At that time the short circuit may be many times its normal value. The generator therefore demands or may demand that the short circuit be opened with reasonable promptness. The service demands delay in opening while the circuit breaker unless larger than otherwise required calls for delay until the first rush is past.

About two years ago, tests were made at the Commonwealth Edison Company's Plant, with a 9,000 kilowatt unit, 12,000 volts, I believe it was, taking it at various voltages, beginning low and carrying it up to full voltage. Some of the tests were made with resistance and some with dead short circuit. It seems to me that tests of that kind have considerable value, not only in showing the manufacturer the weak points of his apparatus, but also in calibrating various designs. If we are going to calibrate our relays carefully, we also want to calibrate our circuit breakers carefully.

About a year ago tests were made at the plant of the Hydraulic Power Company, Niagara Falls, at which time there were four units operating in parallel—7,500 kilowatts per unit giving a total of 30,000 kws. Some 62 tests were made, some with line connected in, some with dead short circuit. The manufacturer had a very good opportunity there, not only to find out the weak points of his apparatus and to correct them, but also to find out just what a given design would do; and it seems to me those tests were very valuable, and duplicated very nearly the conditions in actual practice. While it has been said that tests cannot be planned to duplicate the actual conditions to which apparatus is subjected in practice, it can be said with equal truth that reliable conclusions cannot be drawn from destructive phenomena which occur in actual practice, owing to the impossibility of knowing the conditions which existed at the instant, and to the fact that the conditions were too complicated for analysis—whereas, in the case of test the conditions are predetermined and carefully observed before all record of it is destroyed.

Mr. Burnham. Personally, I am a great believer in tests of any kind. I think they give manufacturers and users a great deal of valuable information. Mr. Badeau's point, however, was this, that the laboratory tests are not the tests of service. If a class of apparatus has been in service for a number of years—oil switches, for instance—and has operated on a plant where it has had considerable energy back of it, 85,000 or 100,000 kilowatts, that shows conclusively, if the operation of the device has been satisfactory, that it is satisfactory on similar installations.

Now, take a new switch, for instance—embodying a new idea of breaking current. You put it in the laboratory and test it, or in a station with an artificial load, under absolutely different conditions from those of actual service; where perhaps your synchronous apparatus may be connected, or where your power factor conditions are entirely different from those in test; where you don't get the surges Mr. Cushing spoke of to destroy the switches, or something like that. He has drawn the line between what you might call two tests to determine whether a switch is satisfactory. Now, service is the thing. Service is what tells a man what the switch will do. It is not a test of a minute, or a few hours, but a test for several years under all kinds of conditions. Nevertheless, I am a believer in tests. The test is the only way in which a designer at the beginning can get an idea of what his design will do. But don't base all your judgment on what has been done in a test covering a few days, because the manufacturers get left themselves sometimes.

I am very sure the author of this paper did not mean to convey the idea that he was not a believer in tests.

One difficulty is that the users of the apparatus do not seem to co-operate, although they are now and have been for a few years co-operating with the manufacturers, giving them exactly the conditions under which the switches and circuit breakers have to operate.

Regarding rupturing capacity, few know what it means, because different companies have different ways of rating switches. There is nothing specific about the way in which the rupturing capacities are tabulated. What you are interested in is how much energy will the switch open. The time limit does not increase the rupturing capacity of the switch. It allows the switch to be put on a circuit where conditions may call for a switch of greater rupturing capacity and to handle a greater current. All the time limit is for is to prevent the switch from opening until the current drops to a value representing the instantaneous rupturing capacity. That is all.

It is foolish to think of the oil switch being increased in its rupturing capacity by simply putting on the relay. The rupturing capacity of the switch depends upon mechanical strength, the amount of air space over the oil, upon the amount of oil over the break, and to some extent on the quickness and length of the break. You can see that the relay has nothing to do with the physical dimensions of the switch. There is opportunity for a lot of work on the rating of oil switches.

One company says the ultimate rupturing capacity. Another says these switches may be used on systems whose aggregate bus capacity does exceed the amounts given in the table or on circuits provided with group switches which will limit the energy to values given in the table. This seems too much. The manufacturer cannot definitely say how much energy the switch will stand—there are too many things involved. But he has an idea based purely on experience. That is all.

It goes without saying that the switch with the greatest head of oil at the instant of break and the switch with the dome-shaped top, where there is a chance for the gases to expand and go out—that type of switch is going to open a great deal more energy than a switch which breaks at the top of the oil and pulls the arc downward, or allows the accumulation of pressure with the resultant destruction of the tank.

Those things are closely related to the rupturing capacity and have to do with it in determining what it shall be for all kinds of switches. It is absurd for any designer to sit in his office and say, "Our switch will give such and such service on your system." He don't know anything about the service conditions, as a general rule. Take a switch installed five miles from a generating station or sub-station, and may open the circuit all right, but it may not be suitable for use at the generating station. We speak of the ultimate rupturing capacity of the switch, not the size of the circuit the switch may go on. That is something for the electrical engineer of the installation to decide. He knows the characteristics of his machines, the length of lines, whether underground or overhead. But the engineer in the factory doesn't know these things unless he takes the time to look up conditions himself.

Undoubtedly, the best switch may be selected by having the engineer at the factory confer with the engineer at the station, so that each gets the benefit of the other's knowledge. I don't agree with Mr. Cushing that you should leave it to the company to tell you what you want. Three or four companies manufacture oil switches. Each one has a plausible argument. What is the central station man going to do? There are three of them and each one tells a different story.

The switch which embodies all of the good points and no weak points is hard to find. They all have good points and they all have some bad points.

When I spoke of the rupturing capacity this afternoon, it was the ultimate rupturing capacity of the oil switch not based on the aggregate amount of generators and synchronous apparatus connected with the system. Take some of the larger switches. The rupturing capacity is often given as low as 3300 and 4500 K.V.A., 15,000 volts, and where is the station that requires such a switch, and that has not got more than 4000 or 5000 K.V.A and synchronous apparatus connected with the system. That switch is used time and again for a feeder switch, where an emergency of 100,000 kilowatts may pump into it. And still it is claimed that it is only good for 5000 K. V. A.

The point is, you have got to use discretion and judgment in the selection of switches and guaranteed rupturing capacity I don't believe amounts to a great deal. After the company has guaranteed the rupturing capacity, how can you hold the company to any guarantee. If you want to tie a company down on rupturing capacity of oil switches, have them guarantee that if their switches don't prove satisfactory they will take them out.

There ought to be some understanding between the oil switch manufacturers and the central station men as to just what is meant by rupturing capacity. Each manufacturer knows what their particular way of stating it is, but when the customer goes to one manufacturer—the General Electric, for instance; and then goes to others, say the Westinghouse or Condit, he finds a difference in rating of 5 to 10 times based on switch of very near the same dimensions; one is bus capacity and the other is the ultimate rupturing capacity of the switch. And that, I believe, is the proper way to rate oil circuit breakers, because that is what you are interested in—how much energy will the switch open?

The convention adjourned till 10 A. M. Wednesday.

MORNING SESSION, WEDNESDAY, OCT. 16.

THE PRESIDENT. The first paper of the morning is "The Relation of the Central Station to the Prospective Customer," by E. M. Addis of Brattleboro, Vt.

THE RELATION OF THE CENTRAL STATION TO THE PROSPECTIVE CUSTOMER.

BY E. M. ADDIS.

Manager, Twin State Gas and Electric Co., Brattleboro, Vt.

It matters not how you may differ with my views, displayed in the handling of this topic, you will each agree when I say, we all appreciate the immense value of catering to and maintaining the good will of the population we serve. Such being granted, this truth leads to the question,—What is our attitude toward those of the public we *do not serve?*

All individuals living within the boundary of a central station zone of service are, in fact, served indirectly through participation in the conveniences of the electrically-lighted streets, brilliant stores, attractively lighted playhouses or other places of amusement, and constitue the raw material on which we depend to increase our sales of electricity, for they are intimately associated with our product through custom and habit, though not directly served by the central station as customers.

Happily for us, the greater number of them appreciate the advantages of this modern illuminant, which combines saving with increased comfort, and need only to be convinced of the facts, to satisfy them that within the bounds of the most economically handled purse, provision can be made for its purchase, otherwise our progress in the field of expansion would be at a stand-still.

That the Public Service Companies dealing in the manufacture and distribution of electricity are waking up to the importance of their general policy, as applied to securing new business, by *catering* to the prospective consumer, may be easily verified by one who will scan the pages of those publications devoted to things Electrical: though more often than otherwise, the campaign of education adopted by some of the larger corporations is outlined, it does not necessarily apply that the companies, which serve the small communities, should not be alive to this important subject. Still, for reasons of limited resources with which to establish a New Business department, many of them hesitate to take this step, feeling that the results obtainable would not justify the expense. In spite of this handicap, I believe it possible for such a condition to be overcome without occurring one dollar additional outlay, if the manager will give the question his serious consideration.

The fundamental secret of any company's success in its dealings with the prospective customer, lies in that company's general policy demonstrated in its dealings with the *public*, which said policy is a direct reflection of the man who fills the manager's chair, and many such incumbent would do well to have a fair and square talk with himself.

In the event of this occasion, I suggest that we review the manager's acts of the previous week. You arrived at the office Monday morning, it happened to be blue Monday with you; Sunday's trip to the lake proved a disappointment, you were out of sorts with everything. The morning mail was not of such a nature to dispel the grouch, several notices of drawing at sight on your Company claimed your attention and you secretly cussed them for their presumption; the cashier comes in with a list of delinquents, on whom you have expended your best efforts in polite appeals for settlement. "Send them a notice of disconnect," you growl. It is sent. One of the notices reaches a customer who, though a little slow in payment, has in the past secured through his influence that short stretch or right of way, which had been holding up the line gang for days, he is your enemy from now on. It would have paid you to have written him just one more letter or to have gone to him personally, preserving his friendship, at the same time convincing him that the cash must be forthcoming, or no more service.

Into your office come two ladies, one a customer, the other a stranger. The lady customer registers a complaint. You are surly and brief. "Meter must be right; was a new one put in recently, and tho' bill seems large, she must have used the current, that's all." The stranger lady is an eager listener to the conversation; your manner has made her glad of not having to do business with you. Your customer goes out with her feelings injured, and no satisfaction promised.

Again your office door opens and you look up with a scowl, which is quickly changed to a smile; your hand goes out in spontaneous pleasure, for the newcomer is one of your few real friends in the town, but *he* also has his complaint. Owing to his friendship for you he consented to have his dwelling wired, the cost of so doing, you assured him would be right; so, now he comes for you to pass judgment on the bill recently handed him by the local contractor. You look it over, the total is nearly double the amount he anticipated, in fact, you had told him that his dwelling could be wired for approximately fifty dollars ($50) and the bill calls for nearly an even hundred. He wants to know why such a discrepancy exists, and if a mistake has not been made. If he had had any idea it would have cost this amount, he would never have had the wiring done. These remarks come from him in all seriousness, and finally winds up with the request, that you do what you can to get the bill reduced. Here again, you are up against it. You inform your friend that the Company has nothing to do with installing interior wiring, this class of work being invariably done by the contractor; the company strings the service and sets the meter only. This has always been the Company's policy, etc., and you admit your inability to help him, though candidly you feel that the price is somewhat excessive. He leaves your office disappointed and of the opinion he has been imposed upon, firm in the belief that the Company and the Contractor are hand in hand to beat the public, while you are genuinely distressed over the incident. You really had the inclination to help him, as you knew he had been overcharged, but your hands were tied. That *iron-clad agreement* you made with the *contractor* stated in positive terms that under no circumstances would you enter into the wiring branch of your business, also, if the truth is told, you were just the *least bit afraid* of the contractor, who might easily be converted into a "Knocker" and hurt (?) business, so you did not sympathize with your friend too openly. He never forgets this, and a small rift is between you, which never undergoes the process of actual healing.

The telephone rings. "Hello! Is this the manager? Well, I would like to have you send me one of those Perplex Flatirons, described on the circular you enclosed with my last month's bill. You don't deal in them? Mr. Doolittle, the Contractor? five dollars each! Why I never heard of such a thing. My nephew tells me the company he works for supplies their customers with the same make of flatiron at four dollars each! Seems to me you are not very accommodating to your customers, I've been told you are a hard concern to do business with, guess I won't use a flatiron." Result.—Another black eye to your business policy. Thus it goes through the whole week, possibly the month and often the year. Still you wonder why you are so unpopular and the company you represent is considered antagonistic and over-bearing, this opinion being shared alike by those who constitute your *prospective,* as well as actual, customers.

Right here it is pertinent to ask:—What shall be the relation of the Central Station to the Prospective Customer? Shall it be that of supreme indifference and offhand manner? Shall it take the position that it sell current only, with no inducement other than being ready reserve? If so, then the writer's opinion is, that the central station is emphatically killing its chances of securing patronage other than which must automatically come to it, by virtue of the commodity in which it deals being a *necessity,* and the field in that direction is becoming more saturated each day, for the hypothetical

Manager is not exaggerated and his future is not distant, when new business will be an exception rather than the rule.

There is no central station in existence which can afford to take the position of "Stand pat," for the live community of today does not "stand pat," and the public service company that does will justly gain the unenviable reputation of being indifferent to its public, upon whose goodwill largely depends its success. So it behooves every manager to map out his policy on a broad basis, just how broad will depend on local conditions, for no one can devise, or formulate a plan, which will apply to all indiscriminately, being like many medicinal remedies, which will cure one patient and be sure death to another, but you may be positive that genuine courtesy, honest dealing, the truth at all times, protecting your customers against overcharges, are methods duly recognized the world over for their sterling qualities, regardless of your locality or the class of people you serve, also that the company which fails to look at a complaint from the customer's standpoint, will lose prestige, for the whole public is merely the customer in large numbers.

Grant every customer a thorough hearing, make full investigation, adding an honest explanation, and you have placed another asset to the public goodwill for the company. Much may be accomplished through a campaign of education by use of descriptive literature, advertising, solicitors and free trials of current consuming devices. The results received from efforts of this description invariably justify the cost. No better illustration can be referred to than the New York Edison Co., which I am told have added nearly one million sockets to its lines in a single year, truly a monument to its established policy of catering to the public goodwill.

Increasing numbers of central station men are beginning to appreciate the importance of low-priced house wiring, as an inducement to the prospective customer. Results demonstrating clearly the eagerness of the public to secure modern lighting equipment when offered at moderate cost. Opinions vary as to the means we shall adopt to install the wiring. Some managers favor the company taking on the work by wiremen in its employ, others are emphatic in their argument, that the contractor should be the medium. Personally, I favor the company carrying out its proposition from beginning to end.

My interpretation of the relation of the central station to the prospective customer at this stage being, to wire his premises for the very lowest price consistent with a small margin of profit, supply him with all current consuming devices on the same basis, and you will have a satisfied customer whose pleasure expressed from the square treatment he has received will be far reaching and do much to make your pathway easy on life's journey in public service.

What part the Electrical Contractor shall play in the program covering your relation to the prospective customer is a question I did not intend to discuss, for my experience prompts me to extend my sympathy to that community whose electric lighting company holds to the hard and fast rule of turning a prospect over to the mercies of the average contractor, who may be likened to the old-time physician, whose only remedy for all diseases was bleeding the patient, and in face of this fact, there are many who advocate a working agreement between the central station and the contractor, their *Slogan* being *Co-operation*, and in the next breath, make the statement that the central station shall maintain a force of solicitors and demonstrators, to stimulate the demand for new wiring and current consuming implements, but *no direct sales* to be made by the service company. While the contractor is willing to *co-operate* with the company in the result of their labors to the extent of installing wires and apparatus, his prices are so nearly prohibitive that not over twenty-five per cent. of the prospects secured by the company's solicitors become customers, truly a grand *co-operation* on the part of the contractor. I hear the contractors say in reply, "We must make a living and charge living prices, for with our *overhead* charges, etc., etc." Oh! those much-abused overhead expenses. Are they all due to business, or merely results of extravagance? Why does the average contractor consider it a particular badge of his calling to be ever clothed in immaculate raiment, invariably adorned with the pin of some prominent secret fraternity, having an air of leisure most of the time? Does this account for a part of his overhead expenses that the prospective customer is called upon to pay? Why should he consider himself above putting on overall and jumper and apply some of his time to a wiring job? Compare him with the average central station manager, who has to be a specialist in all departments and is not above putting on his old clothes and digging the bowels of a boiler or generator when things go wrong.

My reply to Mr. Contractor who answers the appearance I have described, is—get into the harness yourself if necessary and turn out a day's work with your men. This act would do much toward making it possible for you to lower the prices of wiring and prove to both central station and customer that you were doing all in your power for the best interests of both, for I am not inclined to quote in parody, the late Buffalo Bill, who said, "the *only* good Indian is a *dead* one," by applying it to the contractor, as in my opinion the only good contractor is a *live* one and we meet him occasionally.

It is not my purpose to argue the point. Each central station manager has probably figured it out for himself, from his own individual view point, if not, it is a subject well worthy of his consideration.

It is just possible there are among us, some who have but recently reached the goal, for which they have from years of patient study and labor been rewarded, the appointment as manager of an electric lighting company. I warn you not to let the feeling of satisfaction and confidence, which you may justly possess, cause you to assume an air of importance nor to adopt an overbearing manner, during the course of your duties, toward that part of the public, at large, for it includes the customers of your corporation.

You are being judged most critically in every word, every gesture and every mannerism you possess, particularly so if you are a stranger in the locality. Do not blind yourself to the fact that the importance of your position only gives you the right to be all the more a public servant, on whose shoulders the mantle of modesty and square dealing should rest becomingly. Furthermore, use careful and square judgment concerning the benefits (?) to be derived from advice of those whose motive may be of pecuniary value to themeslves. Let your efforts ever be directed toward making your company popular, which process you will find to be anything but easy, particularly if you should have the misfortune to supersede an unpopular manager.

The upbuilding of Public Confidence when once lost is a task that may well discourage the *veteran* manager. Every overture you make with the olive branch is viewed with suspicion, and every generous proposition coming from you will be looked upon as having a "come back" or hidden motive. Listen with patience to those whose slogan, just now, is "*co-operation,*" for there can be no co-operation on your part with any one unless the direct result is of value to your company. Make sure to be shown how they intend to cooperate, for the directors and owners of your company are the best judges of the value of your services and they know if the utility under your management is more or less successful. Furthermore, if your endeavors have resulted in securing the goodwill of your customers, which invariably accompanies increase in earnings, you have no reason to fear the criticism of those who shout "Expensive Kilo-watts."

The President. You have listened to this most interesting paper on a live topic. It is now open for discussion and I hope the members will take advantage of their opportunity.

E. R. Davenport. I want to call your attention to page 5, top of the page, where reference is made by Mr. Addis to a friend of the manager calling on the manager and stating that he is considering having his house wired, and the manager telling him he can have his house wired for $50. In the first place, I believe the manager had no business to make that statement. He was no more justified in making that statement than an electrical contractor is justified in informing your customer as to the cost of operating his factory by electricity. There is absolutely no difference in the two cases.

If the manager would suggest to the prospective customer that he get an estimate from the contractor as to the cost of wiring his house, he would be working along the right line. And I think if he'd stick to that principle he wouldn't be getting into the difficulties he has been getting into. How many of the central stations represented in this room have any written, iron-clad agreement with the contractor that under no circumstances will they enter into the wiring business? And I should also like to ask how many central stations are afraid of the electrical contractor?

Now, with reference to the last paragraph of Page 5, where Mr. Addis speaks of the difficulty of Mr. Dolittle, the electrical contractor. They may have contractors by the name of Dolittle in some towns, but I do not think that is typical of all. It seems to me the central station holds the whip hand over the contractor, and if the contractor sells a flat-iron at $5, it is up to the central station either to have the price satisfactory to him, or to arrange with the contractor a price that will be satisfactory. In our experience, we have never had any difficulty in having the trade agree to a price for an electric flat-iron or practically anything else.

Coming back to Page 4, this difficulty of the hypothetical manager seems to me to be about the most extreme case I have ever heard of. I don't believe that if we had 100 sight drafts on our company in Providence it would cause us to get a grouch. You don't have to recognize a sight draft unless you desire to do so.

On Page 6, paragraph II, Mr. Addis says: "There is no central station in existence which can afford to take the position of 'stand pat' ". I don't know exactly what he means by "stand pat", but I presume he means that the central station man can't afford to co-operate with the electrical trade in his community as to agreeing on the prices at which tungsten lamps and appliances should be sold. It seems to me that is the best policy to pursue, and, in fact, I think the central station business will eventually be devoted to just the sale of electric light and electric power. Tungsten lamps, motors and everything of that kind will be handled by the trade in their territory. And I think that would be an ideal condition.

Referring to what is said on Page 7 about results achieved by the New York Edison Company, I want to say that I recollect a comparison made about three years ago from figures in the Electrical World as to the appliances added on to the system of the New York Edison Company, and that Providence had a better record in this respect. I only make that reference to show that if our policy had been wrong, we probably would not have secured better results than one of the largest companies in the business.

There is also on Page 7 a statement to the effect that increasing numbers of central station men are coming to realize the importance of low-priced house wiring. I want to say that in the city of Providence last year we secured 84 per cent. or better of all the new buildings erected in our territory for light or power.

There are several references here to the fact that co-operation is the slogan of the contractor. It seems strange to me that any criticism should be made as to co-operation. It is only recently that a new organization has been formed here in Boston which I think is known as the Co-operative Electrical Development Association, the object of which is to bring the electrical jobber, the central station, the manufacturer and the contractor together for mutual benefit. If the slogan of co-operation between the central station and the contractor is all wrong, why should this new association have been formed recently in Boston?

The statement is made on Page 8 that not over 25 per cent. of the prospects secured by the company's solicitors become customers on account of the high prices charged by the electrical contractor. I am very sorry if that is the experience in other places. I know in Providence we can make a great deal better showing than that, and if anybody doubts that there is co-operation between our company and the contractors, we would welcome the opportunity of proving that such co-operation does exist and is proving very helpful.

L. J. Chase. I was appointed to discuss this paper somewhat against my will, and I approach the subject with not a little trepidation. In reading Mr. Addis' paper I was impressed with the idea that he dealt at considerable length with the troubles we are all apt to have with the connected customer, and rather neglected our proper attitude toward the prospective customer.

It seems to me that the manager of a public service corporation who, after a bad time at the Lake, goes back to his office and visits his grouch on his customers and on his prospective customers should either take a disposition pill before breakfast or change his business. Now, I want to stick to the subject, which is, as I understand it, our proper attitude toward the prospective customer.

As I look at this question, every person in your community who does not use electricity is a prospective customer, and the problem that confronts us is how we are going to get in touch with the greatest number of prospective customers.. Good advertising will bring a few to your offices and others will drift in of their own accord. But how can we best reach the others, those who do not come to us? In my opinion, the best answer to this question is good citizenship.

The central station manager should take an active and intelligent interest in all matters pertaining to the welfare of the community. He should employ all dignified methods to enlarge his acquaintance. He should be public spirited and make his company a force in the community. In all public movements he should line up and do his share. This attitude will give him a wide acquaintance, and the wide acquaintance will give him splendid opportunities to advance his business. The manager of a public service corporation must not only furnish his company with brains, but in many cases he is obliged to furnish brains for his customers. The central station manager who best serves his employers is the man who best serves the public in his capacity as a citizen.

Our attitude toward the prospective customer should be governed by common sense. We should first ascertain his point of view, and then seek to create in his mind a desire for our commodity. But don't crowd him. Fox hunters tell us that hounds that run too fast drive the quarry into its hole and then the hunt is over. Be straighforward, honest, dignified, alert and persistent, but don't crowd. If you give it half a chance, electricity will sell itself.

Above all, when you have taken on a new customer, begin right with him. Take a friendly interest in his needs and give his installation your personal attention. If you begin by wrangling over some unimportant detail, you invite trouble and annoyance for the future and make an enemy where you ought to make a friend.

And so, generally speaking, I should say it is the duty of the manager of the public service corporation which is as a rule, and should be, a monopoly, to get out into the game and take a human interest in human affairs. And without the slightest idea of egotism, I should like to give you one concrete instance.

Last night I left my comfortable home, where I was toasting my shins in front of an open fire, and went down into a stone shed to address a crowd of about 150 stone cutters, Swedish stone-cutters, on the evils and benefits of Socialism. The fact that my notions on that subject were extremely vague had no particular bearing on the case, because I dealt in glittering generalities and managed to get by without creating any trouble.

At the close of the performance I talked with a brawny Swede and he told me he was glad there was one man in my position who knew the difference between Socialism and Anarchy. And after that very pleasant conversation I committed what the gentleman who preceded me will probably think an unpardonable sin: I took an order to wire the Swede's house for $50. Now, it will probably not cost $50, and he will get the benefit of the difference; but I think that by taking this contract I have made a friend for the company, and I think I will get other customers from among that very desirable class.

MR. SANDS: As they used to say in prayer meeting, I stand before you a changed man. I have seen the light. I remember the time—and it isn't so very far back—when my ideas on this subject would have very nearly coincided with those of Mr. Addis; and I venture to make the prediction that the time is not far distant when Mr. Addis himself will, by force of his own reasoning and from the very necessity of the case, change his views, too.

On Page 4, Mr. Addis has very aptly described that "blue Monday" which we have all experienced. But I think he has failed, perhaps, to differentiate between a mule and the central station manager. The function of the one is to give kicks and the function of the other is to take them and smile, and it is just as easy to do that, if you train yourself, as it is to growl.

Speaking of the manager's friend on Page 5, Mr. Addis says: "He never forgets this, and a small rift is between you which never undergoes the process of actual healing." It seems to me that this is one of the prime functions of the manager—to heal those rifts—and I believe that it is possible, provided the position taken by the central station manager is a just one. If his position is an unjust one, he may fool himself into thinking he is healing the rift, but he never can do it.

On Page 6, second paragraph, Mr. Addis has depicted a Utopian condition—the saturated field, where we have all the business and all we have to do is to sit down and fold our hands and take it up. We have been looking for that condition for a great many years. I have a few gray hairs, but I expect to have a lot more before I ever see it.

In the next paragraph, he speaks of the "stand pat" attitude, and seems to infer that the attitude in which a central station contends that interior wiring and appliances should be installed and sold at a price which gives a fair profit is a stand pat attitude.

What is the incentive of any business? What is the incentive of the central station business—of the very merchant to whom you are selling current? Profit. Isn't the contractor just as much entitled to a fair profit as the central station manager is? On more than one occasion I have had a customer come to me and ask whether I was going to allow the contractor to wire his house and charge him a profit for it, and I have said to him: "My dear friend, what are you in business for? Profit? Yes. Well, isn't the contractor in business for the same reason? I believe he is.

On page 7 the author refers to the question of co-operation. It seems to me that co-operation in any line of business is absolutely necessary to success, and if you don't have co-operation with your local contractor in the electrical business, the results are suicidal both from your own and from the contractor's standpoint. We speak about the attitude of a lot of contractors, about their unreliability and irresponsibility. But I wonder how much the central station is doing toward making him better? In many cases the contractor was originally a workman and worked for you. He was ambitious. He wanted to do something better than earning a day's wages. He got a little money ahead and started out. The central station immediately proceeds to put the knife into him. If he figured on a job the central station manager went and tried to cut under him. That has been the experience of many a contractor, and naturally when he gets a job he tries to get all he can out of it, because he doesn't know when he will get another.

How much better it is to co-operate with the contractor, if he will do business on a fair basis, and let him get a fair profit.

On Page 8, Mr. Addis speaks of "prohibitive prices." Now, everything is great or small only by comparison, and just what the author would consider a prohibitive profit, I don't know.

He also speaks of overhead charges and indicates that those overhead charges are visionary rather than real. I venture to assert that if the average central station that is engaged in interior wiring and thinks it is making a profit would charge to its interior wiring department that proportion of its overhead charges that properly belongs there, it would find that it was losing money and playing to a losing game.

In the same paragraph, he criticises the contractor because he is always clothed in immaculate raiment and invariably adorned with a pin of some secret fraternity. That is a type of contractor that I have not often met. My experience may be different from that of most of you, but I have found few contractors who could answer Mr. Addis' specifications, and those who could were the fellows who were prosperous and had business enough to keep them looking after it, instead of being down in the engine room cleaning boilers. I don't think a man is to be criticised who has built up a business which necessitates his attending to business. Personally, I think the central station manager had better be looking for business, and let the engineer clean out the boiler and generator.

The author speaks of the "live contractor," and I submit that there is little enough to make the contractor in your town a live one, so long as the central station, with its ability to purchase material and supplies at a lower price than the contractor can, is constantly bucking him.

In the last paragraph, Mr. Addis says: "For there can be no co-operation on your part with any one unless the direct result is of value to your company." I don't know of any business under the sun where we have to bank so much on indirect results as we do in the central station business. I should like to give you a little personal experience on indirect results.

Several years ago, I was figuring on an installation of about 200 horse power. The manufacturer desired a certain make of motor. It was not the make for which we had the agency. A local contractor had the agency for that make. I could have secured it for the customer just as well as not, but the local contractor wanted the business and I said "All right. Let him have it." That same contractor last year—and this plant isn't a very large one—put over 700 horse power in motors on our lines. Does it pay?

Now why is it that many of us are still clinging to this idea that the central station must furnish to its customers interior wiring and current consuming devices at a small margin above cost, or at cost and, in some cases, less than cost? Do we expect the man who sells us our coal to furnish us our furnace and cook stove at cost, or a small margin above? Do we expect the ice man to sell us a refrigerator at cost? I admit we have a bad habit, which I hope in time we will outgrow, of expecting the gas man to sell us gas ranges at a small margin above cost.

Isn't it that we have failed to realize the way along which we have come? We had a hard struggle in the beginning. The kilowatts were expensive and the service was punk, and we did everything we could, even to giving appliances away, to get customers on our lines. I think we did well. But that day has gone by, and if today it is necessary, in order to expand our business, in order to get our customers to use these current-consuming devices, to sell them at a very small margin above cost, a margin that will not permit the contractor to handle them at all, there is either something wrong with our service or the price we are charging for it.

Mr. Nichols. Mr. Addis has drawn for us in order to drive home his point, a hypothetical manager who is a surly fellow indeed. Surely this pen picture so carefully drawn for us is an exception to the rule. Mr. Addis portrays for us a fellow who has had a bad Sunday at the Lake and who comes back to the office feeling out of sorts with the world. The fact that he does is contrary to what one would expect after the hours of relaxation from business effort.

He relates for us the story of the man who has had his house wired because he is a friend of the manager and who complains because the contractor has charged him more than the manager estimated the cost would be. We do not want in Woonsocket a customer who wants his house wired simply because he is a friend of someone in the Organization, but we do want customers to wire their houses because they need our commodity. Frankly, we don't believe that there are many men who wire their houses simply because they are friends of some one who is in the business of selling current, and not because they really need this modern illuminant.

Improved public relations are the keynote of this paper and the dominating factor in the policy of a progressive organization. Why then do we divorce from these relations the contractor who is potentially a power of no small measure toward the betterment of our relations with the public or an antagonistic public sentiment according to our attitude towards him.

Obviously, the problems confronting the central station manager vary according to local conditions, and his attitude towards a particular phase of central station activities is invariably influenced by a perspective, the limit of which is confined within the zone of his company's operation, but this individual and collective experience represents a contribution of value highly conducive to the proper conduct of our industry.

The attitude of Mr. Addis in regard to the electrical contractor is probably the result of local experience, but our experience prompts me to take an opposite position in relation to this important and allied industry.

The contractor is with us to stay, and progressive policy has divorced the interior wiring business from that of the central station. This work is usually conducted at a loss when done by a public utility, and the customer that wants something for nothing is not eliminated by absolute monopoly from the generator to the socket.

Having reached the conclusion that we cannot and have not the disposition to annihilate the contractor, we believe that the logical procedure is to obtain his co-operation and friendship.

Our activities embrace a broader field than his and they should not be competitors. Our energies are most profitably directed towards the development of the immediate business of selling light and power and rendering satisfactory service, rather than engaging in the contracting business.

We consider that the wiring contractor, is of necessity, an agent towards the extension of our service. He is a factor towards the increase of our revenue that is not included in the company's commercial expense. Hence his confidence and friendship tend to our advantage, whereas his enmity is baneful and generally may, in cases of large installations, lead to isolated plants and lost business.

We exist on the most friendly terms with half a dozen contractors in the locality we serve. Their field and ours is defined and understood. We are at all times pleased to plan an installation for a prospective customer without charge, but the interior wiring is a transaction between the customer and the contractor. The latter submits his estimates of cost to the customer, as we have learned too well the futility of making estimates even when this work was a phase of our operation.

We follow the work of the contractor and would strongly resent an exorbitant charge, but it should be borne in mind in connection with excessive charges that even the contractor must conduct his business according to the accepted standard if he desires success, because failure to do so spells loss of patronage and bankruptcy.

It should not be assumed that we do not wish to increase our revenue by making every householder a customer. On the contrary, intensive development is a condition to which we give earnest effort and consideration, but we believe the best results are obtained in accordance with the course outlined.

We are concerned in seeing that the prospective customer is fairly treated, but believe that the contractor can wire a house as cheaply as we can, give satisfaction, make a reasonable profit. If he has confidence in the fairness of the central station, his friendship and assistance will make possible real cooperation advantageous to both.

There exists a very important phase of the central station's attitude towards the prospective customer which has not received attention. It causes more ill-feeling and misunderstanding than anything else I know of. I refer to the question of deposits to insure the company against loss on account of bad bills. Many companies approach the applicant for service in a spirit of doubt as to his credit and demand a deposit of a fixed sum, or an amount based on probable consumption, before they are prepared to accept his patronage. Isn't this system patterned after the ancient and conservative policy of our gas friends, rather than resting upon the foundation of necessity?

Admittedly, one-half of one per cent of the gross earnings is considered more than the average loss on account of bad bills under normal conditions. This being the case, at least 99 per cent of your charges against consumers are paid. Why then do we assume a doubt as to the credit status of the great majority to the disadvantage of the company? Why not take a fair business risk in relation to the average customer, approach the question of credit from the standpoint of the commercial house and collect the bills in a persistent but courteous manner. A great many companies follow this policy and find it pays.

The customer's first impression of the company's methods should be favorable and a progressive and broad minded attitude on our part is largely productive of the desired result.

MR. FLEET. I should like to call the attention of the central station manager to just one thing. This paper has been very ably discussed, and the subject has been very ably handled by Mr. Addis. But I think the "blue Monday" manager might well turn his eyes up to the little sign above this platform, which reads: "Be Just and Fear Not."

I believe that if we treat all our customers in a fair, square and truthful manner, we can fear not. The results will come.

As regards co-operation, I am a great advocate of co-operation. I believe that if you co-operate with the wiring contractor you are going to do much toward building up your business. If the contractor is out for the sole purpose of beating the public, the sooner you co-operate with him, get under his skin and show him the error of his ways, the sooner you are going to make progress with that contractor.

As far as the central station fearing the contractor is concerned, I don't think there are very many cases of that kind in New England. It is possible for the central station to go into the wiring business and clear its skirts, but I believe that is all.

If, as Mr. Sands points out, the overhead charges of the central station were charged up against wiring in the right proportion, the central station would come out just about even on its wiring contracts and there would be no big profits in it. I don't think the central station has anything to fear from the contractor. On the contrary, in Portland, at least, we have made friends of all the contractors. In fact, they walk into the office in the morning and say, "Hello, Bill, what is on this morning?" And a typical answer would be: "Well, Mr. So and So of Such and Such a town is thinking of wiring his house. We have given him your name and the names of the other contractors, and told him you would be glad to bid on the job." They all feel free to come in, and when I find a contractor is not coming in to find out what business is on, I immediately go out and call on him and try to find out what his trouble is. He may have a grouch and say: "I am not being treated properly by the crowd in the office. They are not doing the proper thing by me. I haven't got any contracts for wiring through your sales agents for a month." "Well," I say, "let us investigate this thing. Come down to the office and let us see what is on." We have a little friendly meeting, a friendly scrap, perhaps. Perhaps the contractor is wrong, perhaps the central station men are wrong. They may have some grudge against him. And that has got to be smoothed over by the manager of the central station. He has got to iron it out, and iron it out in such a way that a good, friendly, wholesome feeling will remain among the whole lot of them.

I believe that all of the electric men in a locality ought to feel that they are dependent on one another for business, and that they want one another's help. In Portland we have succeeded in getting the contractors to build up a little association. They endeavor to maintain prices for wiring at a certain figure, as near as they can. They can't make any hard and fast rules, of course, and I am glad they can't. For instance, one man may have a big lot of work on. He can't afford to take any job at a small margin. Another fellow may have a big crowd of men idle. He can afford to take a contract at a small margin because he wishes to hold the men over for another contract that is coming along in a week or 10 days. And so it goes.

In conclusion, I wish to emphasize the point with which I started, that if the central men are only just, they may fear not.

Mr. Wyman. Two points occurred to me on reading Mr. Addis' paper. A good many years ago, in a place where I used to go in the summer, there was a boy of my own age with whom I used to play. After nine or ten years I didn't see him for a good many years. One day a few years ago his father, whom I had not seen for twenty-five years, dropped into my office and asked if I remembered him. I dug him up after a while. "Remember my boy, Charley, don't you?" he inquired. I said yes. "Well," he said, "Charley has an awful good job. He works in Philadelphia. They hired him to think. He don't do a darn thing but just put his feet up on a table and think all day." When I read this about the central station manager, I thought of Charley. I don't believe it is the business of the central station manager to dig out boilers and generators. It is up to him to attend to the business he is carrying on, to see that his customers are getting proper treatment and that every phase of the business is running as it should.

I believe the real place where our relations with the new customer begin is with the old customer. We are very apt to treat our old customers the way a friend of mine spoke of yesterday. I met him at the hotel. He was feeling pretty good. He dug his thumb into my ribs and said: "I have a fellow hooked all right now. I got a $10,000 contract out of him. I'll fix him all right. There's $4000 in it for me." Well, when we have a new customer we are very apt to think we have him "hooked." I believe the way to deal with that man after we have him hooked is to keep feeding him, looking upon every subsequent sale to him as if it were a sale to a new customer, giving him every attention and making him feel good generally. If these men are treated in that way, we have 25 or 50 per cent. of the population working for us every day.

In this matter of the contractor, I am sorry for Brother Sands. He has left me and wandered into heathen ways. He doesn't believe in the central stations doing house wiring. Down in the bush we have to do it. I think the central station business needs the attention of the company that is furnishing the current from the point where the customer first sees an electric light or an electric flat-iron and begins to be interested in it, until he is paying all the money he can afford, after paying his board bill, to the electric light company. I don't believe we can always afford to turn him over to the contractor. When a customer comes in and says, "I want my house wired," we can't always say to him, "We can't do that. Go to Bill Jones down the street. He will wire you." He may go and he may not. Perhaps the solicitor can steer him around. But that morning when he came in and said he wanted his house wired, or wanted a flat-iron, he was ready to have his house wired or to buy the flat-iron, and that was the time to catch him, to get the hook into him.

We have been wiring houses for a good while. We try to carry our contracting business separate from the central station business, and we have never had a month yet when we had red figures on the contracting business, after charging in all the office expenses that properly belong to it. And if we can't get business that will pay we don't want it. We don't want a thing that doesn't yield us a profit, and we don't want a contractor around the premises who won't get that profit out of the people. There is not any such thing as a prohibitive profit to get out of the man who wants what you have to sell, but you can't stuff it down his throat. If you make a man want a thing he will buy it at a fair price. He makes a profit on the stuff he sells and is willing that you should get a profit on yours.

Mr. Hayes. I have been unfortunate in not having heard the paper or all of the discussion. But it seems to me that we must all agree that there are two viewpoints that may be taken by the central stations in regard to this matter.

Some of the managers report that they must be in the wiring business, while some others report that they can get the wiring done satisfactorily by the contractors. It must be admitted that the wiring must be done and done at a fair price to the customer. Perhaps it doesn't matter who does it, so long as the customer is satisfied. Those companies who can arrange in some way or other that where there are contractors they shall do the wiring, that arrangement is doubtless very satisfactory. In the smaller places, where the contractors haven't entered into business, doubtless, it is a fact that the central stations must undertake this work.

It should be borne in mind that the price charged should be sufficient to cover the expense of this work. It seems to me that the prospective customer should be led to appreciate the value of the work which is sold. We should not, as central stations, endeavor to give away something. It is my experience that whenever a customer has been handed something, or something has been given him at less than its value, he fails to appreciate its value and at the same time looks, perhaps, for the "nigger in the wood pile." He wonders why you are giving him all this so cheaply. He is skeptical. In dealing with the prospective customer on a general merchandising proposition, as business is conducted today, I think we all realize that strenuous efforts are made on the part of the stores to make a favorable impression. Very great effort is put forward to attract trade. Likewise, the central station should endeavor to attract trade. I think it is a fact, also, that the stores that are successful in attracting trade likewise endeavor to retain it.

The best asset the central station has is a satisfied customer. One single satisfied customer will doubtless bring in more prospects than much promotion work. Therefore, it seems to me that the question of the attitude of the central station toward the prospective customer is not open to argument. I think it is almost obvious what this relation should be.

Personally, as to the wiring business, which the author of the paper has discussed at some length, I think satisfactory results can be obtained by dealing with the contractor, endeavoring to get him to do that which in many cases the central station is obliged to do. First of all, before the contractor has anything to offer customers, the central station or the contractor himself must create a demand on the part of the public for electric light or power, a demand for electric current. At the present time, with the tungsten lamp of the smaller wattages, it is a very simple matter, it seems to me, by advertising campaigns, solicitors, etc., to create a decided demand for electric illumination, as well as for electric power.

Granted that the demand has been created, the customer then becomes solicitous that his work shall be done. He is the one who has to see where and when he can get his wiring work done. The customer must then approach some one who is in this business, and approaching him is, of course, expectant of paying something for what he wants to get. It seems to me that after the demand has been created, the customer, in going to the contractor or the central station, is in the attitude of trying to buy something, rather than the contractor or central station in the attitude of trying to sell something. If you can get the prospective customers in the attitude of trying to buy, you can do much better than if you are trying to sell them something which they do not demand.

MR. PRINCE. I should like to say a word as to co-operation between the central station and the contractor in the light of some local experience in Hartford.

Some years ago we decided to get up a set of rules laying down the way we wanted meter boards built, where we wanted the meters, and, in general, how the equipment should be set up. The first move was to draft a set of rules. Then we called a meeting of the electrical contractors of the city and laid before them the proposed regulations, with a view to finding out whether it would complicate their task of getting business, in that we had definitely specified that certain things must be done before the company would place a meter, etc. We found that we got the goodwill of the contractor and likewise placed the contractors on an equal basis and settled many difficulties they were unable to settle in their preliminary talks with prospective customers.

Likewise we have an inspection department under a competent inspector, who, as soon as the consumer signs an application for electricity, follows that job from the time of the actual signature on the application for current, to the actual setting of the meter and almost to the first bill; and in that following of the job most of the work is done with the contractor.

In many cases of large prospective power consumers, it is necessary for the consumer and the contractor and the central station inspection manager to get together and lay out the switchboard that is to be installed. It is necessary for the central station to tell the contractor the number of meters and the style of charge on the meter. It is necessary sometimes for both the contractor and the prospective customer to get the advice of the central station as to the style of motor to use for different classes of service. And in all these conferences one of the most important men is the contractor.

The central station is willing to go with the prospective customer as far as he wants. We will even furnish him estimates of wiring, at the same time not endeavoring to get the business away from the contractor, but merely to give the man, if possible, an estimate of what the wiring is going to cost, and oftentimes at the same time telling him to go to several of the reputable contractors and secure similar estimates from them, that we are not at all sure we can do it as cheaply as the contractor.

All this has tended to make very close relations in Hartford between the central stations and the contractors, and in every case the contractor has acted as an unpaid solicitor for our company.

Mr. Carpenter. There is one little keynote which seemed to be quite prominent at the start of the discussion and which seems to me to be a little bit unfortunate. I can explain what I mean best, perhaps, by the answer a young mother got from an elderly woman who had raised twelve sons. "I have a little boy," the young mother said, "and I am desirous that he should be a fine, upstanding man. Now, you are a woman of a great deal of experience. You have raised twelve sons and they have all turned out splendidly. I wish you would give me some advice as to how to raise my little boy." The answer of the elderly woman was: "I raised 'em twelve different ways."

Now, Mr. Addis is probably speaking of conditions as he finds them in Brattleboro. Mr. Davenport, I think, should speak of conditions as he finds them in Providence, or as he did find them in Brooklyn. I don't believe Mr. Davenport ever worried over a sight draft in either Brooklyn or Providence, although, possibly there may have been some sent through. I know it is very easy to discuss things from two entirely different viewpoints and lead perhaps to some little ill-feeling. It seems to me that sort of thing should not crop out here even in the slightest degree, because all we are here for is to learn from the experience of others how we can improve ourselves and make ourselves more valuable to the companies employing us.

A good many years ago I was appointed receiver of an electric light company which had a capital stock of $5000. I was chief engineer, business manager, solicitor, wireman and everything. We took that plant and made it a fairly good success, so that we succeeded in selling it to somebody else, who continued it along. I think practically everything said here is true and of distinct advantage under the conditions to which it has been applied. I can't imagine Mr. Davenport going down to the engine room and helping them on their engines, but I can easily imagine the time when it was necessary for Mr. Addis to do that, or any manager of a small plant.

Of course, our properties are very small, but we had one instance that justifies Mr. Addis' statement with regard to the central station's fear of the contractor. We didn't really fear him very much. But we had a contractor in the territory of a company I am connected with who got himself appointed wire inspector and then proceeded to drive out all the other contractors. When we began to take him to task he started to run for selectman. He is not living in the town now. We felt we had a duty to perform.

Now, what might be all right for a little wagon loaded with kindling wood wouldn't do for a 3000 ton schooner loaded with coal. The conditions are different and the situation must be dealt with accordingly. In our case, we do business with contractors. We always threaten to do wiring, but have done very little of it—simply wired a few places to show we could do it. But we don't want to do it, because we feel we can devote our time and energy to better advantage in the exploiting of our business and getting all the customers we can.

As one gentleman said here, "Every contractor, if you treat him right, is working for you all the time, and he is not on the payroll." That is a distinct advantage, it seems to me, and I think that unless the community is very small it pays the central station to co-operate with the contractor and get this valuable service out of him for which there is no equivalent on the payroll.

I feel that when a central station goes into the wiring business, the wiring department should carry itself. I don't believe we should wire at cost, or at less than cost. In my opinion, the day has gone by when it is necessary or desirable for us to go into the wiring business except on a purely business basis. That might have been justifiable twenty years ago, but not today.

It seems to me that the smaller companies can co-operate with their contractors in the way of buying and reselling to the contractor at a lower figure than he can buy them from the manufacturer, his wire supplies, lamps and things of that sort. We handle the lamp situation in the manner, started a great many years ago in Pittsfield. We have lamps on sale at a small profit in the standard five-lamp box in some store in every town or village we supply. That is our policy. We haven't yet extended it all over our territory, but we intend to. We also sell them to the contractor at a lower price than he can buy them. It seems to me that practical co-operation is the true keynote of the whole situation.

The President. We have with us today the Secretary of the Electric Development Association, Mr. Carter, who would like to explain the purposes of the Association.

Mr. Carter. You will pardon me if I am not able to enter into this discussion, because I am neither a central station man nor have I had any experience in central station work. But as a consumer of current I should like to offer some suggestions.

In talking with friends and acquaintances during the past few weeks, I have been strongly impressed with the fact that all who are interested in the electrical business are lax on the one point of explaining more particularly and more definitely to the general public the question of the safety and convenience of electricity. You do a lot of talking about fans and stoves and flat-irons and matters connected with current consuming devices, but I am surprised to find that many, many people are very ignorant on the subject I have mentioned, convenience and safety. I think you would all do well if you exploited that more in your advertising.

My neighbor, Mr. Stover, asked me confidentially a few days ago if an electric flatiron was actually a safe electrical device for him to purchase for use in his home.

Another friend, who owns a house built within the past three years and which cost him $20,000, asked me, after a call at my home one evening, why his architect and electrician had both failed to tell him of the great convenience of the baseboard outlets which I have in my house.

Dozens of people have asked me at our booth during this electric show what was meant by the Edison Co. 3c. rate which was advertised on a poster in a booth near us, and when told they immediately inquired if electricity on this 3c. basis was cheaper than gas.

My assistant in the office tells me that hundreds of people are using electric ranges and electric fireless cookers in Minneapolis where she resided until within the past few months. I do not believe that there are many more than 100 in use in Massachusetts, if there are in all New England.

In searching out the reason for this lack of knowledge on the part of the public, one is surprised that so little information has been furnished to the public concerning the use, utility, convenience and safety of electricity and electrical appliances, considering the comparatively great length of time electricity has been serviceable for common use and the immense number of men engaged in the exploiting and upbuilding of this industry.

For instance, there are in Massachusetts alone at the present time 483,906 gas meters in use, while the total number of electric meters is only 106,638. Can we of the electrical industry be content while this state of affairs exists? Can we not improve our present methods by broader concentrated effort and co-operation and by the mutual activity of all concerned, to place the electrical industry of New England, and finally of all the United States, on a much stronger, broader and bigger basis?

The lack of deep, active interest in this electric show on the part of the electrical fraternity as an entirety is amazing. Why is this? Because there has been no general organization movement separated from any single branch of the industry, working unitedly with The Edison Electric Illuminating Company of Boston, and, therefore, there has been less general co-operation than should have existed. Not that you who are here have failed in your interest and activity. But think how few of you are here and how few New England electrical men have visited the show and urged others to come, compared with the number of men who should attend and evince an interest in the broader development of the electrical business of New England.

At a meeting at Association Island, New York, on Sept. 2, 3 and 4, I found about 120 men gathered together, among them the leading spirits of the largest manufacturing firms in the United States and the officers and executives of the various national electrical organizations which have been developed within the life of the industry. These men were actually representative men from every known phase of the electrical business and its diverging interests in the commercial world. They were there for the sole purpose of considering co-operation of all interests and how to remedy this condition which I have mentioned. They spent three days on the Island, away from all distracting influences, in order to concentrate on this one subject. They there decided that the formation of a new, unbiased and unrestrained association was necessary in order to apply the remedy which should cure these electric business ills.

At this meeting Mr. Edward B. Strong, Secretary and Treasurer of The Electrical Development League of San Francisco was present and talked with me concerning the fragmentary movements along this line which had sprung up in various sections. Since then he has sent to one of your executive board members a copy of a paper read by Mr. W. W. Briggs, Assistant Sales Manager Westinghouse Electrical Mfg. Co., San Francisco before the Electrical Development League of San Francisco. This paper was read on Sept. 10, 1912, and from it I desire to read the following extracts:

"Collective attention has not been given to the possibilities of general good to the electric industry that are latent in an organization like the Electrical Development League, and it is further possible that, if our ideas were directed to the channels where this organization could stand sponsor for the different trade and social organizations of the electrical industry, a greater general benefit might be secured."

"The central stations have their problems and the manufacturer, dealer, jobber and contractor each have theirs, but the welfare of all of them is related."

"Thus any condition that develops adverse to the interest of the central station industry will be reflected along the line felt by all other allied interests. Ill-considered, adverse legislation affecting the securities or management of public service corporations tends to restrict the development, which condition is at once reflected in a general trade depression—the manufacturer finds his apparatus orders falling off, the contractor finds little or no work to do where extensions of service are not under way, and the jobber and dealer find their business lessened in consequence."

"Unfair and arbitrary rulings and inspection by the city or underwriters' authorities unduly harass the contractor, involving him in unnecessary and unforeseen costs, placing his industry on an unstable basis, reflected in reduction of working surplus and restriction of credit. The indirect effect of costs and delays incidentally are again felt by the dealer and the jobber in the unstable credit situation, obsolescence of stocks, etc."

"It often occurs that the authority under city or underwriters' inspection is placed in the hands of individuals incapable of clear interpretation of the regulations and from whose rulings there is no appeal."

"There are many regulations incorporated in such rules that fail of their purpose of safe-guarding the consumer and reducing the fire hazard, and which regulations would appear to have been incorporated for the principal purpose of favoring some patented article."

"We must first firmly fix in our minds that this Electrical Development League is formed for the principal purpose of advancing the electrical industry and that such a result cannot be accomplished by anything but by a policy of standing firmly on a plank of fair and equitable treatment of all with whom we come in contact. We should have no time for anything that smacks of trick or device, but support only such policies as make for advanced conditions in every sense of the word."

"Take for instance, the case as above mentioned, of ill-considered and inadequate legislation on the part of a governing body, such as would unjustly affect a central station. The presentation of a protest by that central station, as an individual company, would probably have limited effect, owing to the feeling that this one station had an "ax to grind." However, should that station be a member of an organization such as ours, and have discussed the condition with our committee, and finally, through that committee, has presented the matter to this body and received its unqualified endorsement, then, when presented to a governing body, backed by the weight of opinion of the electrical industry as represented by our organization, believe me, they will be heard with a degree of interest not possible through other means."

"Consider the possibility of the inspection bureau having an inspector improperly equipped either in technical knowledge or temperament to properly administer his duties. A complaint, no matter how well founded, emanating from a central station, a contractor, or a number of contractors, would have comparatively small weight, as the complainants would be the parties directly interested. Could this matter have been referred to our organization and have received its calm and judicial study, a protest from such a body would carry much weight."

"In this field, then, there is a possibility of great good being accomplished by organization, and, in consequence, added opportunities for the development and advancement of business, due to solidified presentation of such matters."

"I would suggest that consideration be given to possibilities of development under this head, and that it be considered the duty of a grievance committee to take up, study and report on such matters as might be brought to their attention from time to time."

"There are many other things that could be developed by initiative in this line of endeavor, such as the formulation and advocacy of amplified wiring regulations, to care for the growing appliance and electric sign business; the preparation of papers issued under authority of this League, which would interest architects, engineers and others, and point out to them the desirability of caring for appliance and sign loads when laying out building and residence wiring."

"Let us disabuse our minds of the impression that we have a 'God given right' to be in the electrical business. In these days no one can succeed by hanging out a sign and sitting back complacently and feel that he must thrive because of his sign."

"This applies to every interest represented, and one of the greatest things that this League can accomplish is to so stimulate its members that they will put behind them old, worn-out traditions and bring to bear on collective and individual interests and the necessity of being up and doing in creating new business."

"The jobber, dealer and contractor have no justified complaint to make when a central station enters the appliance field and apparently takes business from them, when they (the jobbers, dealers and contractors) are satisfied to sit back and take care of such business as offers without an effort to stimulate the demand, or when they take no pains to see that appliances of proper voltage, etc., are supplied. The central station wants to sell the energy, and if those to whom, in the natural course of events, the appliance business belongs, will not fill their functions, the central station is justified in so doing."

"Similarly, the consulting engineers should not complain if the manufacturer and his engineers encroach on their field, when they, themselves, will not properly fill it, and apparatus and energy sales lie dormant, awaiting some one with initiative to inspire their uses."

"Ethics to the contrary, the time has passed when any field of endeavor remains closed to other activities, when one or more interests must suffer because of the failure of a branch of the industry to properly fill the space allotted to it in the original scheme of things."

"I am impressed with the fact that a large part of our energies are expended in endeavoring to take from each other business already created, rather than looking afield and seeking where our activities might better be expended in the development of new applications."

"In this organization we can accomplish much in this direction by collective thinking. To be sure, the interests represented here are largely competitive, but they are also interdependent. A stimulus given by any one's initiative will bring him a just reward, and still the business as a whole will have been improved and every one ultimately will secure his relative share of the development."

"There is a vast field for development of new business along electrical lines in and around these communities, in which the membership of this organization are interested, and I feel that through an interchange of ideas by papers presented at these meetings, by a mutual understanding of each other's problems, the initiative necessary to develop new business may be stimulated."

"Again let us emphasize that we all owe a duty to the public and our customers and consumers, to safeguard their interests. The contractor who would, for a temporary profit, advocate the use of an improper or antiquated device or wiring system, the dealer, jobber or manufacturer who would, to clear his stock or for other reasons, furnish the customer with improper lamps or other devices, or the central station manager who stoops to misrepresentation to secure a contract, have no place in this organization and are not entitled to its support."

"In the disposition of our commodities, whether they be energy, appliances or machinery, let us not advocate taking the path of least resistance to secure contracts or orders, but rather study our customers' requirements and give them the benefit of our knowledge and experience, to the end that, from our activities in our chosen field of endeavor they will secure a maximum of service at a minimum of cost."

Now, friends, I have only a few things to say to you further about the Electric Development Association, which was incorporated under the laws of Massachusetts on May 1, 1912, and which now has a substantial membership composed of central stations, contractors, dealers and jobbers in New England and manufacturers throughout the United States who sell material in New England.

This organization is not a question. It is an incorporated fact. Already the organization and its work are known and attracting attention from coast to coast.

Copies of the prospectus issued by the Electric Development Association have been mailed to all central stations, contractors and dealers in New England, and I therefore presume that all here are thoroughly familiar with the plans as outlined therein.

Those who have devoted their time to the preparation work in this movement have been very agreeably surprised and certainly delighted at the hearty response which has already been accorded this plan to unite electrical New England.

Now, gentlemen, the thought which our members desire you to weigh carefully is the fact that the hearty support and cooperation of the New England Section of the National Electric Light Association will be one of the strongest factors possible to aid this Electric Development Association in accomplishing the purpose of our motto:

"Mutual Co-operation Brings Immense Returns."

MR. WYMAN. A copy of the declaration of principles of the Electric Development Association was sent to our company. It was understood that it was to be adopted at the first subsequent meeting of the directors. I wasn't able to be at the meeting and don't know whether the principles were adopted or not. But what impressed me in reading that declaration of principles was this: The Electric Development Association started among manufacturers and jobbers and contractors, who asked the central stations to co-operate with them. The declaration of principles, which was 3½ pages long, used up about four lines of that space in describing conditions under which a successful jobbing and contracting business can be carried on. It devoted 1½ to 2 lines to showing that the business of manufacturing and selling current is entirely the business of the central station. That is true. But if we are going to co-operate for the general good of the business, then the principles under which the central station flourishes, or under which it must be maintained if it is going to flourish, should be just as much a part of the declaration of principles of that association as are the principles under which the jobbers and contractors can flourish.

The convention adjourned until 2 P. M.

AFTERNOON SESSION, WEDNESDAY, OCT. 16.

A stereopticon lecture was given by Mr. R. D. Coombs on "Transmission Line Construction" and was very highly appreciated. (This lecture is now a part of the National Electric Light Association's Lecture Bureau and can be obtained by members upon request. We would emphasize the fact that the National Association has a series of lectures on different subjects which are available for Company Section meetings."

MORNING SESSION, THURSDAY, OCTOBER 17.

The President. The first paper this morning is by Mr. C. H. Miles of Boston on "The Development and Application of Electricity to Agriculture."

THE DEVELOPMENT AND APPLICATION OF ELECTRICITY TO AGRICULTURE.

By C. H. Miles.

The Edison Electric Illuminating Co., of Boston.

"Back to the Soil" is the cry of the modern economist. Never before has there been such a wide-spread interest in agricultural matters. As a nation we have been prodigal with our resources, and we are now beginning to feel the pinch that must follow inevitably such a course of action. The meagre rewards that have been gained in agricultural pursuits, coupled with the drudgery of the farm have sent the best youth to the cities, and our production of food stuffs has not kept pace with the consumption. At the recent meeting of the American Bankers' Association at Detroit, nearly the whole of one session was devoted to papers and discussion of agricultural matters. Interest in the farm is wide-spread. That the present high cost of living would be materially reduced by a backward flow to the land no one would seriously deny.

To help work out this modern problem the electrical engineer has set himself, and the improvement of agricultural methods is worthy of his best efforts. Most of us can remember the beginning of the electric light, the trolley line, and the factory motor drive. All this has been accomplished in a generation, and this revolution has been wrought by the untiring efforts of our engineers. The general adaptation of this great modern force to farm work is still before us, and promises fully as satisfactory results in improving the efficiency of this branch of human industry as has characterized its application to all others in the past. We must confess that we are actuated not wholly by disinterested motives, for the consumption of current for farm purposes is practically wholly "off peak" and is highly desirable for the improvement of the load factor, but we believe in addition that the general use of electricity on the farm fills an economic need, that the work can be accomplished with better results and with less expense than by any other means available for this purpose at present, and that by generally applying electricity to agriculture we are helping mankind as well as ourselves.

The farmers, especially in New England, are probably the most conservative class in existence, and they have to be shown, so that a campaign of education is necessary before any great results can be obtained. In furtherance of this educational idea the Boston Edison Company has erected a tent 100 ft. long by 60 ft. wide and has filled it with every kind of electrical appliance that can be used on the farm, dairy, stable, workshop or kitchen. This tent is moved from place to place in the territory and so far has been visited by 10,000 people in the outlying towns. As the exhibit is located here in its entirety no detailed description need be given at this time. That it has aroused much interest, and has been productive of many inquiries that are bound to result to the mutual profit of both customer and company goes without saying.

There is probably no one purpose for which power can be used that will bring greater financial gain than for irrigation. This use in the West has been extensive for several years and is constantly growing. In fact, many of the western plants derive a large part of their revenue from this source, for in some sections a crop would be impossible without an artificial water supply. In New England, however, an absolute crop failure from draught is unusual, but the ability to apply water in abundance to a growing crop when needed, often means the difference between a large profitable yield and one that barely pays expenses.

It has been said in criticism of the American farmer that he does not farm the fence corners. Our land has been so abundant and so cheap that so-called intensive farming has not been necessary, but now that the free land is practically exhausted, to accommodate the growing population a greater yield per acre must be obtained. Irrigation gives this increased yield at the minimum of expense. It has been estimated that irrigation even in New England in normal years adds from 50% to 100% to the average crop. When it is considered that this increase is gained with little additional labor, and without materially impairing the fertility of the soil, we begin to realize the value of water to the farm. Some years ago Mr. Hale, the great peach grower of Georgia and Connecticut, who has always been an ardent advocate of irrigation, began a lecture on this subject with the words "Let us spray."

Growers in Arlington, within ten miles of Boston, are using lands for farms that are assessed for $1,000 per acre. Use of such land would be impossible for this purpose without intensive farming and an abundance of water. These growers are engaged in a manufacturing business with a certainty of results as though building wagons or watches.

We have recently supplanted a steam pumping plant in that town with a 25 H. P. motor driving a De Laval centrifugal pump at 3600 R.P.M. and pumping about 200 gallons of water per minute against an average pressure of 90 lbs. The cost of this current is but little more than was formerly paid for attendance on the steam pump, and about 30% more water is delivered at a moment's notice. The pump is started whenever water is required and the attendant goes about other work, leaving the pump alone and locking the door, when the day's work is done it is simply pull the switch and expense stops. The water in this installation is used through open hose and the Skinner system, which latter consists of a series of small nozzles placed horizontally in a supply pipe fixed about two feet above the ground, the application of the water being similar to natural rain. During last June and July when we had practically no natural rainfall and this plant was in constant operation the cost for power was about $4 per month per acre. During that dry period the writer was driving by this installation and happening to see the former engineer of the steam plant remarked to him that the present pump must make it a good deal easier for him. "It does not," he said, "I have to work on the farm now."

We have also come to learn that the reclaiming of land by drainage is a very important item in the modern plans for conservation. If we are able to effect a combination of pumping water from land that has too much to other land that has too little, we are accomplishing a double task at the expenditure of energy for one. The use of electricity for drainage pumping, or for irrigation, makes a highly desirable load for the station. Its use is confined to the long days of summer with no use at all during our busy season. On the power schedule of the Boston Edison Co. such an installation earns a very satisfactory rate, in fact, much lower than if it were operated throughout the year, and the simplicity of the unit mentioned above commends itself, as practically no attention need be given to it.

Authorities have estimated that animal horse power costs eight cents per hour and that manual labor, 1/8 horse power, a minimum of 11 cents per hour, so it is clear that wherever it is possible to supplant these two sources of power by electricity marked economy will result.

There is now a bill pending before the National Congress looking toward the establishment in the Department of Agriculture of a Bureau of Farm Power. It is to be the duty of this Bureau to investigate and report upon all matters pertaining to methods of furnishing power on farms, and all labor saving machinery adapted for use on farms, and the use of electricity, gasolene and steam in propelling farm vehicles and in operating plows, reapers and other machines.

"It shall be within the province of said bureau to make diligent investigation into the matter of machines and labor saving devices used in the dairying industry as conducted on farms, and into the methods of heating and lighting of farm buildings."

"In general said bureau is authorized and directed to diligently investigate all machinery, methods and devices which will lessen the amount of labor necessary in agricultural pursuits, and lessen the expense of producing and marketing such of the necessaries of life as are produced on farms."

Should this Board be established, as it undoubtedly will be, a great field must open for the central station, and it is up to us to show the marked superiority of electricity to gasolene and steam in farm operation as we have been able to do in other lines of effort. The experimental stage of this application is past. We know that it is practical and economical and the only thing left for us to do is to fully acquaint prospective customers with its advantages, and as the modern farmer is leaning more and more upon the results obtained at experimental stations, both State and National, as shown by their bulletins, we can reach this class of customers to good advantage by laying the results of our experiments and tests before boards of this kind.

In a recent issue of our monthly publication of "Edison Life" our illustrator made a sketch of the farmer "doing his chores" after a visit to the Farm of Edison Light. In the background was the barn with a pole line leading to it and the farmer was standing in front with his "choring" tools, which consisted of a pair of pliers and a coil of wire. This is quite a change from the days of our youth.

At present there are many items of waste on the farm that can be profitably utilized by the application of power. Perhaps the most important is the shredding of cornstalks for cattle feed. These stalks have a large value for feeding but the cattle will not eat them when fed to them whole, and even when chopped into small pieces a large part will be left, but when finely shredded every part will be made available. The oat crusher also works on similar lines, and it is estimated that a horse receiving 12 quarts of whole oats per day will thrive equally well upon nine quarts of this at present high cost feed when crushed. The bulk of the nine quarts will be considerably more than that of the 12 quarts of whole grain, and the good results are not obtained from fooling the animal, as might be supposed, but from the fact that every part of the prepared food is digested. Tests of this work show that the grain can be crushed finely for an expenditure of less than 1/5 of a kilowatt hour of energy per bushel.

The milking machine, where the herd is sufficiently large to warrant the investment, is the greatest boon to the dairyman. One of the most disagreeable features of farm work is eliminated, and it is undoubtedly true that a better and more intelligent class of labor will seek work on the farm when the task of hand milking becomes a thing of the past. The advantages are cleanliness, which is highly important in these sanitary days, and the further fact that as cows should all be milked at about the same time a very small amount of labor is required even for the regular milking of large herds.

The writer believes that the first electrically driven milking machine in Massachusetts, if not in New England, was installed on the lines of a plant with which he was connected nearly ten years ago in the town of Lexington, on the estate of the late J. Reed Whipple. This machine did not prove satisfactory as the yield of milk was apparently lessened, and its use was discontinued after a few months. The milker of today, however, is perfected so that trouble of that kind need never arise.

Tests have been made showing that the energy consumed in this work is approximately one kilowatt hour for each milking of 50 cows, a use so small that the cost per unit of current need not be considered. The same machine also curries the cattle on the vacuum cleaner principle, which adds much to the sanitation of the modern barn.

Electrically driven cream separators, milk testers, churns, butter workers and bottle washers follow as natural corollaries to the foregoing, but as this type of apparatus easily lends itself to the motor drive no further description is necessary. On many farms a refrigerating set can be used to financial advantage.

The water supply, even on dairy farms, is of prime importance and the motor driven pump provides the only flexible system. Where a general use of irrigation is made it may be possible in some cases to use the same unit for both purposes, but in general a smaller unit used exclusively for water supply for both house and barn will prove to be a more effective arrangement. If this is connected to pump against a pressure tank with an automatic starting and stopping device a constant supply of water is available for domestic and barn purposes, and even for fire protection, and the latter is worthy of careful consideration because of the comparatively remote location, and consequently high insurance rates of the majority of farm buildings.

A small motor arranged to drive a group of appliances such as a grind stone, an emery wheel, a small lathe, a saw table and possibly a clover cutter, corn sheller or root cutter, calls for a small investment and saves much time and labor. Doubtless, many of us look back upon the turning of the grind stone in our younger days with remembrances not wholly of joy.

The foregoing applications of power have been for the barn and water supply and in these cases the motors usually would be fixtures. We come now to the heavier work of the farm, such as cutting ensilage, wood-sawing and splitting, operating a hay carrier, baling hay, feed grinding, and making cider. It will be noted that these operations come at different times in the season so that a single motor mounted upon a truck and moved to different locations within a reasonable distance of the buildings will do all this work and keep the investment at a minimum.

The hardest task in the above is the cutting of ensilage, so that the size of the motor for a given installation would be governed by the requirement for this one purpose. Usually a 10 H. P. motor is ample, for its overload capacity will allow it to perform work for which a 15 H. P. gasolene engine would be necessary.

It is not uncommon for farms of moderate size to depend upon some outsider with a gasolene engine to fill the silo. As everyone's crop of corn is harvested at about the same time, often there will be a considerable delay in securing the power and the crop may not always be gathered at the right time. With the small investment that is necessary for a 10 H. P. motor, and its adaptability to so many other uses throughout the year, the farmer has the added advantage of being independent and having his power ready for use at just the right moment.

On poultry farms the electrobator is available and the electric brooder and by their use at a purely nominal expense one of the worst fire risks is avoided.

The interest of the growers and farmers is very much aroused in all these applications of electricity and they are evolving ideas of their own. Last winter, while talking with a prospective customer who was operating a number of large greenhouses, he said to the writer "We raise our plants under glass, give them plenty of water, the proper amount of heat, some ventilation, and still the plants are not strong. I believe that they need in addition a strong wind, such as they occasionally receive when growing out of doors. We know that men gain strength by opposing resistance and why should not plants, so I am going to put in some big electric fans in my houses and turn a fifteen or twenty mile breeze over the plants occasionally."

The idea was ingenious, but unfortunately one of the cold snaps of last winter killed all his plants and no opportunity has offered itself since to try out the theory.

The possibility of using electric delivery wagons in the marketing of vegetables and milk has also aroused a great deal of interest. The stops are frequent and no great mechanical skill is required on the part of the driver, and for work of this kind the electrical vehicle is ideal. By charging when the other power is idle the load line will be lengthened and a very low transportation cost will result.

The application of high frequency currents to stimulate plant growth has been worked upon somewhat in Germany with what is claimed to be satisfactory results. This is accomplished by stringing a network of wires over the plants and the static discharges to earth apparently hasten the maturity of the crop. It is an interesting subject but we are not prepared to say that it has reached a commercially profitable stage.

I have purposely omitted any detailed tests tending to show the actual cost of grinding a bushel of corn or cutting a ton of ensilage by electric power. My aim has been to show that all these processes can be done readily by this means. The actual cost of the electric power will take care of itself as it has done so often in the past in work of other kinds.

In those companies which base their charges upon winter demand only, a rate per K. W. hour will be earned for this class of work, intermittent though it may be, that will compare favorably with the rate earned by small factories operating nine hours per day throughout the year. This class of business will also be served well by those companies who give an off-peak rate, and it would seem to be the part of wisdom for companies who at present employ neither of the above methods to devise some form of rate that will encourage this business. Some judgment undoubtedly must be used in the extension of lines, for customers are comparatively far apart and extensions can be made that will force profits to the vanishing point, but this problem each company will have to work out for itself. The business is here and we must take care of it.

I have spoken of farm power, but there is another side of this electrical invasion of the rural districts, and that is the use of electric lights in the farm buildings and lights and electrical appliances in the home. Gas is not usually available so that we have no competition from that source, and probably never will have, and certainly will not if we get there first. We are all looking forward to the day when it will be perfectly feasible from all points of view to cook by electricity, and that time is not far distant. I have noticed that there is a greater percentage of our lighting customers in rural communities now using electrical appliances—flat-irons, etc.—than there is in large towns. When electric cooking becomes economically practicable we shall see these customers among the first to use current for this purpose. The successful farmer of today is a business man, and, while somewhat bound by conservatism and tradition, he is keenly alive to the necessity of labor saving machinery and the elimination of waste, and from the very nature of his business there is much unavoidable waste of man and horse labor where electric power cannot be had.

A little thought in the grouping of driven machines and sufficient study given to each problem to insure the proper size of motor will result in a flexible installation with a comparatively small investment. A 10 H. P. motor costs no more than one good horse and need only be fed when it works.

As much produce can be raised on three irrigated acres as can be secured with five acres without water and only a small investment is required if water is at hand. The motor of today seldom needs repairs, which fact is of more importance on the farm than it is in factories, where competent mechanics are available. There is no fire risk and the apparatus can be placed anywhere in the buildings, where often a gasolene engine would be impossible.

The use of electricity on the farm is no longer a fad of the rich, but is fast becoming an everyday necessity for the man who gains his living by the tilling of the soil. Our power has everything in its favor for this purpose and the harvest is ripe.

Mr. Larrabee. I hesitate to say anything following so conclusive and ably rendered a paper. I would, however, like to bring out one or two points about conditions outside of what we might call the metropolitan district of New England.

Our section of New England, namely, the northern section of Vermont, is quite different from the sections immediately surrounding Boston. At the same time I want to emphasize the fact that our farmers up there are pretty well up to date. They are pretty green, you have to show them almost everything, but they are willing to take hold of new things.

I find that the advertising matter we have put out among the farmers up there has given very good results. That may be due to the fact that they have more time to real that sort of thing, but they certainly give it better attention than the man who lives in town or city; and I think the direct return from advertising which goes into that section is far better than we get in the towns.

There is another thing that helps in reaching this business in that section of the country, and that is the fact that we have so many high-tension lines going out from our water power plants. These, of course, all have to go across the farms over which we have rights of way, and that puts us in position to get this business with comparative ease and with a very small amount of extension—practically no extension at all—by simply putting in the present pole type of high-tension transformers.

We have on our lines one or two farms so situated that they use electric power for the operation of milking machines, ensilage cutters, for cutting hard wood for winter fuel, and so on. One of these, which has a three horse power motor and two one horse power motors for running milking machines, pumping water, etc., gives us a return of $150 a year at a 5 cent rate. We are getting that out of a 2½ kilowatt transformer and one 20 ampere meter, which is a pretty fair return. That is probably the best farm we have around our section of the country.

There is also a continual demand for extensions in the northern part of New England for service in the farming districts. A year or two ago we extended a 2000 volt line about 3½ miles and for that we got 40 customers. And some of those are running separators and things of that sort, but mainly it is lighting. To those 40 customers we sold either 30 or 31 flatirons within a couple of months. So you see the farmer even in green old Vermont is looking for all the good things.

There is, however, one objection, according to my idea of getting at that proposition, and that is this: you have to put in—where you take off a high tension line, the farms being so far separated—one transformer, practically, for every customer; and inasmuch as those transformers cost anywhere from two to two and one-half times as much as the same size of standard transformer—that is, a 2000 volt transformer and you usually have to add two or three extra poles—the investment runs up pretty high. So that in trying to get that sort of business, we have attempted to get it only in such places as we can get at least three times the return per customer as we would get on our 2000 volt distribution.

That seems to be the only difficulty—at least, it is the only difficulty we have encountered in getting that business. But there is a tremendous lot of it going all around, and I find we have to watch out for it pretty well. For instance, there was a call for an extension to a farm which came up for consideration quite recently. The farmer wanted to put in a cream separator, an ensilage cutter and a few things like that. When I looked at the matter I found he had to run 35 pole lengths, and we finally concluded we could not do it.

The point I wish to make is simply this. There is a whole lot of that business to be had. It is easy to get at the farmer on account of the efficiency of the advertising matter we give him. The only thing to look out for is to get enough money for the service.

MR. HALE. I have been much interested in reading this paper. It seems to me that the situation today is that while there is an immense field for the use of electricity on the farm, the farmers have as yet to acquire the habit of using it, and until the farm hand has kicked around for a year or two with motors, he is afraid of it. Unless the farmer can go down to the cross roads and pick up a farm hand who knows about motors, he is worried for fear he cannot use electrical machines. Some day, however, the farmer will find that all except the good-for-nothing farm hands can handle and look after motors and a non-electric farm will be a rarity.

I may illustrate this question of habit by the experience of an English company that has close connections with some of our American people.

They were using underground work almost exclusively, and were attracted by the fact that in America overhead work costs only a small fraction of what underground work costs, especially in the smaller cities.

They tried to put up some overhead work, and found that while in America the ratio between overhead and underground work was something like four to one (we will say), in England it was only two to one or one and one-half to one. The reason was that in America the central station could always go out and pick up linemen at a moment's notice, even if they could not get the highest class of linemen, while in England it was almost impossible to get experienced men for overhead work, except after a great deal of trouble or delay, and every new helper had to be taught all the details.

For underground work, on the other hand, the case was exactly the reverse. They could find men who were familiar with underground work easier than we could find them in America.

In a similar way, when gas ranges were first introduced the average cook would not use them, while today it would be hard to find a cook who would not insist on them.

We are going to have the same experience in regard to electric work on the farm, and the moment any great number of farmers in a district get into the habit of using electricity they will refuse to use anything else.

The moral of this is, I think, that it is up to the central station to train the farmers and get them into the electric habit.

The individual farmer does not look into the future. He cares only about the present costs, and it is up to the central station to look into the future and stand the cost of development.

For instance, I think that every central station that supplies a farming district should buy one or more outfits, including motors, etc., for crushing oats, and should put these outfits out on trial, paying the cost of wiring and installation. Of course, they would not do this except in places where it would look as though the outfit would pay.

They should then convince the customer by his own practical experience that the outfit would pay. If it does not pay, the central station should stand the entire loss of the experiment.

If, however, the outfit pays, the farmer should be asked to pay the whole cost, but not the cost of changes or experiments.

In either case, as soon as that experiment was finished, the central station should put either the same outfit, if it was thrown out, or a new one if the old one had been bought and paid for, to work on another prospect.

As soon as such a plan begins to be successful it clearly pays for itself. So long as it is unsuccessful, it is part of the central station's cost of development, and it is much better for the central station to put out machines on trial and take them back without cost to the prospect, whenever they prove a failure, than it is to force the prospect to pay anything for an unsuccessful experiment.

In some cases the central station may fairly ask the manufacturer to share, as, for instance, to ask the manufacturer to supply the machine on trial, while the central station pays the expense of wiring, etc., but in many cases this is difficult, especially when the electric machine is handled by a jobber or contractor who has to pay the manufacturer in any case.

It is no discrimination for a public service company to put out machines freely on trial, so long as they are finally taken out or else sold to the prospect at their full value, both for the machine and for the installation, and the price need not include the cost of any experimenting or changes.

Of course, it is very nice to draw up pictures of the modern farmer holding a pair of players instead of a rake, or to have exhibitions, or put out advertisements in the paper, or send out solicitors; but I think the real effective thing is for the solicitor to go out and find the places where electricity on the farm will pay, then let the central station put it in and work it until the case is proved either one way or the other for that particular prospect.

Finally, the central station will find just where each machine will pay the farmer, and where it won't, but until the central station has really obtained this information, the best thing to be done is to put the machines to practical use at the expense of the central station.

MR. CARPENTER (Martha's Vineyard.) I find it very hard to say much in discussion of this paper, because Mr. Miles has evidently spent much time and gone into almost every conceivable phase of the subject. However, in our territory, which is quite rural, we are attacking this problem, and perhaps a few suggestions as to what we are doing may be of value to some other members.

This "Back to the Soil" slogan with which he opens his paper is, it seems to me, a keynote that is almost a warning. People have been leaving the farms for years and going to the city, until now it seems they must either be driven back or go without eating.

There is one point there—"agricultural pursuits, coupled with drudgery." It seems to me that in our discussion of agricultural pursuits, that idea of drudgery should be eliminated, because the man on the farm today doesn't do, perhaps, when you come to average his whole year, any more or harder work than the man in the city.

It seems to me that one thing which would help us some would be to get in touch with the local educational boards. We have done that in our territory. We publish articles in the newspapers and have people go around and talk to the granges, and we have often had public meetings. The result of those things has been that two of the towns have added to the curriculum of the high school a course in scientific agriculture.

Just how that is going to work is a question in my mind. Take the average teacher in the high school. He is an academic man and believes the only true purpose of educating a boy in the high school is to fit him for college, and it is pretty hard to get the idea into his mind that it is worth while to spend much time in educating a boy who is going to work on the farm. And yet I think statistics will prove that of every one hundred boys who enter our grammar schools, possibly not over two ever go to college. And still we are educating them all to fit this college standard. The college passes the word to the preparatory school that it has got to have boys of a certain standard before they will be admitted. The preparatory school field is practically the modern high school, which passes the word to the grammar school, "We have got to have boys of such and such a standard." And so very little attention is paid to the ninety-eight boys who are just going to work for a living as electric light men and men of that sort do—who are not going to live by their wits, but who are going to work.

It seems to me it might possibly be the duty of the central station to help, at least, in those matters. I was very much interested yesterday in the discussion of a gentleman from Concord, N. H., who evidently feels that the man in charge of a large proposition like an electric light plant, which has its ramifications through town and city, should be vitally interested in these things. I think, in order to carry our properties to their highest development, we must go into those things more or less.

Now, there is another little thing that comes to my mind here, and that is the factory motor drive. Mr. Miles has said that the beginning of that was easily within the memory of most of those in this hall. Here is a query. The distribution of electricity at low prices is gradually bringing about an enormous change? In our grandfathers' time each man in the community did something. One was, say, a butcher, another a shoemaker, etc. I remember having had called to my attention out in Stoughton a number of years ago a little bit of a shop, which was the first shoe shop anywhere around there. This is very near the mammouth shoe factories of Brockton.

Now, the farmer works pretty hard through the summer, but during the winter I think he has comparatively little to do. And isn't it possible for us to stimulate some sort of activity, whereby the farmer during the winter time can start a little shop and make gloves, or something of that kind, and use this vast amount of practically idle farm labor all through the winter? Isn't that going to make farm life more desirable and also more profitable? It seems to me that steps can be taken along those lines which will lead to something of great value, both to the farmer and to the electrical industry.

Mr. Miles says there is probably no one purpose for which electricity can be used that will bring greater financial gain than for irrigation. All my experience tends to that view also. A man in our territory, which is a summer resort territory, who brings his crop to market after the people who naturally buy that crop have gone—for instance, the truck farmer who gets his vegetables to market when there is nobody there to buy them—he does his work, but doesn't make a profit. If he could have irrigation and planted his seed so that he could have his crop in the market when the people are there to buy, it would be a great thing for him.

Let me give you an idea of what this means. The people of Martha's Vineyard probably buy garden truck of a value rising $200,000 a year *that isn't raised on Martha's Vineyard.* On that island there are a great many acres of arable land, and thousands of dollars worth of garden truck can be raised there if we only had irrigation. That is the first and biggest problem before us.

The average farmer on those islands is a Portuguese. There are a few Americans, but foreigners are gradually taking up those small farms. And this year we installed for one of the leading Portuguese market gardeners an electrical irrigation system.

I will tell you how I propose to work that out. We are all looking for business after midnight. Irrigation fits in there beautifully. That market gardener has five acres under irrigation. He has a plant equipment big enough for one acre. He runs acre 1 the first night, acre 2 the second night, and so on to acre 5; so that every fifth night he gets his shower on the acre that happens to be in operation that night.

We installed an automatically controlled motor, operating the Skinner system—which to my mind is the system best adapted for New England farms—and at 11 o'clock, or whatever hour the time-switch is set for, it throws on this motor. The farmer is in bed. There is no labor at all. The sun isn't shining on the land, and he gets all the benefit of a nice shower up to sunrise, when the switch is set to shut off the power. It is non-peak, fills in the valley it is most desirable to fill in, and is most desirable from the farmer's standpoint, because the water falls on his land when the sun is down and in the morning he gets the full benefit of the sun's rays, all day, which is the very best condition.

In one of the towns we supply they ship, I think, normally from $60,000 to $75,000 worth of strawberries to the Boston market every year. This year the shortage in the crop was probably $30,000, and I haven't the slightest doubt that $5000 paid to us, and perhaps $2000 or $3000 for interest or depreciation on equipment, would have given that extra $30,000 worth of income to the farmers. Those are our problems.

Another thing. We must not lose sight of the women and girls that live on these farms. Mr. Miles brought out the value of water supply by electricity. In the old days you had to walk across the lot, pump your water and bring it in. Now you put in your electric driven water plant, have hot and cold water, and all that sort of thing, which makes the work in the house very much easier.

All those things are contributing to make the farm attractive, so that people will want to go back to them, instead of having to be driven back. And it seems to me the central station can help a whole lot in this matter.

We look to the West to feed us, and I think that is a mistake, because right under our noses—in fact, I don't believe there is a central station in New England that has not a large amount of development work along those lines that can be done at a profit if they will look for it. Not only are you going to improve your load factor, but you are going to bring direct returns into your treasury by selling the current, and you are besides going to help build up the community. And in that development there is no one who will share any more than the public service corporation itself.

Mr. Miles has said, "Let us spray." With this system of irrigation, just imagine a man having an acre of potatoes. He has irrigated that acre until, say, twenty minutes before the time of shutting down. He gets up early, goes down to his irrigation plant and stops it. He puts in his arsenate of lead or Paris green, or whatever he proposes to spray with, starts up his machine again, and in twenty minutes his whole acre of potatoes is sprayed perfectly.

Another benefit—liquid fertilizer. No fertilizer is of much immediate value unless it is easily soluble. You take a soluble fertilizer, and instead of putting it on when you plow or when you plant, you put it in your irrigation system and put a small amount on eight or ten times during the season. There are all sorts of things like that, and, we are trying to educate the farmers in our districts along those lines.

Another thing. Of course, through the winter the most of us have all we can attend to. This business of which I have spoken comes in the summer time when we have ample capacity, so it seems we could give a rate that would be very satisfactory.

I notice only one thing that the author of the paper has not treated on and that is in the dairy. I don't know whether you are aware of this or not, but the fact is that a process has been developed for the treatment of milk, so that it is possible to keep milk in an ordinary ice refrigerator in the summer for two weeks and have it remain sweet.

This electric treatment of milk—I don't know how it does it, but it practically electrocutes all the bacteria and brings about a change in the milk. When the milk finally sours, it does not clabber but divides itself into a sort of fine powder. This last summer there were some experiments tried in New York City at the Foundlings' Home. Little babies not expected to live were put on this milk, and in every single instance the child took hold and thrived. There is something about this electric treatment of milk that, while keeping the milk from souring, at the same time increases its digestibility. And while there is probably not very much for the central station in this, everything of this sort, of course, helps, and it is a very interesting development. It is something like Pasteurization, but instead of heating the milk by passing it through a warm pipe, the milk is passed between electrodes, and the electricity actually flows through the milk itself. It warms the milk, which is then cooled and bottled ready for delivery.

MR. MARTIN. I note, Mr. President, that Mr. Miles refers in his paper to the proposed bureau of farm power, and says that this bureau will undoubtedly be established. In view of that statement, I think it perhaps devolves upon me to say that considerable difference of opinion exists among those who are giving attention to the subject as to whether it is really advisable to attempt to achieve the purpose at which we are aiming in that way.

While Congress has the reputation of being somewhat extravagant in its expenditures, I think those of us who have had any experience in the halls of legislation at Washington will agree that it is extremely difficult to get enacted a measure which will create a new bureau, a new department. And this comes, strange to say, not merely from the opposition of members of Congress themselves, but very often from the jealousy of the departments and the jealousy of existing bureaus, which are afraid that their powers may be curtailed in one direction or another by the establishment of a new office.

These and other reasons have led to the belief that perhaps, in view of the importance of irrigation, to which attention has been directed so pertinently this morning, it might be better not to attempt the creation of the proposed bureau, but to try to secure all that we want through the Bureau of Irrigation in the Department of Agriculture.

I venture to express the belief myself that this perhaps is the more feasible plan. I had the honor of calling upon the Secretary of Agriculture a few months ago, in accordance with instructions given me by the Executive Committee of the National Electric Light Association, and on vote of our Annual convention, to suggest that the department take a more active interest in this very subject, and to suggest to Secretary Wilson that we needed this kind of help from the national government. And at that time I was quite surprised to find practically very little interest on the part of the Secretary of Agriculture in the general subject, as well as a woeful lack of information as to what we electric people were doing in the world of agriculture. I came away with the impression that we were working, perhaps, along wrong lines.

During the past two weeks, the Executive Committee of the National Electric Light Association, on the proposal of Mr.

Charles L. Edgar, has expressed its approval of this general idea and has instructed me to do all I can to assist in carrying it out.

In the meantime Mr. Edwards, of the General Electric Co., who has given so much attention to this subject, with the cooperation of some of our good friends in California, who are even more deeply interested than we are in the East—has gone to Washington and taken up the subject on this new point of attack. I venture to believe that, instead of essaying the creation, against a good deal of opposition, anyway, of a bureau of farm power, we will get all we need in this direction by the extension of the powers of the existing bureau of irrigation in the department of agriculture.

I think it is due to Mr. Miles that I make this statement—not by way of correction, because he could not know these facts, but simply as an indication that events are moving in the proper direction.

Personally, I have enjoyed this paper and the discussion very much, indeed. But as I am here in New England, not as a New Englander, I want to enter a protest against the depreciation which has been directed against the New England farmer on the point of his intelligence and his mechanical ability. I think the skill of the New England farmer as a mechanic has been very much underestimated, just as in New York we have underestimated the skill of Boston in baseball.

I happen to spend my summers at a little farm in the Berkshire hills, and every time I go up there it is a joy and a pleasure to me, not merely to get away from my customary duties, but to see how skilful the New England farmer is, remaining as he may be, on abandoned farms, very often, which he is trying to bring back—to see the average skill and intelligence he exercises along lines of work and development we are more inclined to associate with city life. I have seen better brick laying and better handling of tools and appliances, better mechanical skill generally displayed than I can possibly get in the average city, no matter how much I pay. I think the New England farmer is waiting and ready to have our appliances and apparatus put at his disposal, the main consideration being, as has been said, that the current shall not cost him too much.

When we remember that we have in this country 30,000,000 horses and mules, 90 per cent. of which are engaged in agricultural work, and when we remember that animal power costs 11 cents an hour, as compared with manual at 8 cents, and that we can supply it at 5 cents to 3 cents per kilowatt hour, there can be very little doubt about the opportunity that awaits us, or very little delay in availing ourselves of it.

The President. Any further discussion, gentlemen? We should be glad to hear of other applications.

Mr. Martin. That reminds me. I have had two applications brought to my attention during the past week. One is a suggestion of dried fruit work that might be done in New England. It is the ripening of walnuts, which is now being done on an extensive scale in certain parts of California. Heretofore walnuts have been ripened by exposure to the air, the process taking eight or ten days. By the new system, putting the nuts on trays, above electric resisters of one kind or another, and passing warm air through slowly, the process is reduced to from 24 to 36 hours, and the resultant is very satisfactory as to weight and quality and things of that kind.

The other point, which was incidentally referred to in the paper and by one of the speakers, is that of electric incubation.

As an illustration of the extent to which that can be carried —and I should say from my knowledge of New England that it is very applicable here—one electric incubator in New Orleans now has a capacity of 6000 eggs. Let us go and do likewise.

Mr. Fleet. After Mr. Miles' very able paper and the very able discussion which has followed, I feel as if I had very little to say. But I am here to ask a question. I want to know something. I want to know how to reach these farmers.

Last fall I took a little trip back up into Maine to the hunting grounds where I usually go to shoot deer, but never shoot any. The first year I went to that camp—a farmhouse—there was no telephone within ten miles. I was obliged to walk ten miles to get a telephone, if I wanted one, or to drive. The next year I found the telephone was within five miles. And the third year, very much to my surprise, and I don't know but perhaps to my sorrow, the telephone was in the camp and I could not get away from it.

Now, I inquired of the farmers how that was put in, what the cost was, etc. I found the farmers had subscribed to a common fund. They had bought the poles and dug the holes, set the poles and strung the wire, with the aid of one expert, as they called him—a man who climbed the poles and connected the telephones up. The farmers themselves had paid for the wire and all of the apparatus and installed it in order to get the use of the telephone system. After the system was installed it cost them about $12 a year, which they were very glad to pay. They felt they could more than make that up by having the telephone in their houses.

It struck me then and there that central station men might turn that same idea to mighty good profit themselves. In other words, in installing any electric apparatus and connecting up any service, we must necessarily get at least a 20 per cent. premium, or return on our investment, or we can't do business. That is, you can't jump from here half a mile down the road, connect up a fairly good customer, and then go on another half mile and get another fairly good customer. If we go out into the rural districts where the farms are more or less far apart and there are only occasional small villages, if we can work out our lines along the system followed by the telephone people, I believe we would accomplish a great deal. And that, I believe, could be very easily done and the farmers would be glad to get electricity in that way.

Within the last two years we have connected up four little communities, with about 20 customers in each one. What first brought the matter closer to my attention was a man coming in who had five different farms and wanted power.

He asked for about 7½ horse power. I sat down and figured the cost of reaching the man and I found it would be about $5000. That was the cheapest I could possibly get out of it. Since that time we have done some reconstruction of some of our large transmission lines, which left me three copper wires that were to be taken down. But instead of taking them down I simply lowered them onto a lower arm, away from the 20,000 volt line, and connected up the small towns as we passed through them. I got about 40 different customers on that circuit. But that is a case that doesn't occur every day, and that is not what we are after. We want to be able to start out and run down this side of the road and that side of the road. But how to do it—that is the rub. We can't do business for the love of the farmers, nor for the mere pleasure of connecting them up. We must get a return on our money. How are we going to do it?

Mr Martin. Have you figured on iron wire circuits?

Mr. Fleet. No, I never thought of that. That might be a good thing. But I think if the farmers would supply the poles and would assist in putting them up, so that we could cut down our cost of installation, I believe we could do a great deal toward getting them in. We can't do it for nothing. Our directors are after us for returns on their money.

Mr. Martin. You are speaking of running these circuits on the pole lines. Do you mean the high tension circuits on the telephone pole lines?

Mr. Fleet. No, not binding them.

Mr. Martin. There is a very important point about that. The telephone companies at the present time are objecting very strenuously to the admission to their pole lines of our circuits carrying about 5000 volts, for the reason that their protective apparatus lets go at that point. I should imagine that if that is insisted on, and does not lead to some objection from our side, it might be a good deal of a restriction on the work we are trying to do and which has been placed on the telephone pole lines.

Mr. Fleet. I think that comes about from the fact that these rural telephone circuits are mostly with a ground return. Of course, to get our telephone current with a ground return, you know what happens to it. But if we could get the telephone companies to help us out in some way, whereby we could get a metalic return, then we could possibly get along on the same set of poles.

Mr. Martin. I know of one case—I think it is in Mr. Hale's territory—where the company, desiring to carry a transmission service through a rural district, had to go five miles out of its way because it could not use the same pole lines as the telephone company. You can see that that is a serious burden on construction.

Mr. Fleet. That is one of the serious difficulties we have to contend with, I believe, all over the country. Some three years ago we ran a transmission line 20 miles, 22,000 volts. We selected the most direct route to the town. We got halfway over the route and found that we run plumb into a telephone company's trunk line. The road was narrow and it was impossible for the two of us to get along so close together, so we had to take an altogether different route, resulting ultimately in a much greater expense than would otherwise have been required to run that transmission line.

Mr. Hale. I think this telephone difficulty depends on who gets there first. I was in a western town recently and the telephone company was calling up insisting that the electric light company must not put 20,000 volt wires on the telephone poles. The electric light man said over the telephone: "You went ahead and put your telephone wires on our 60,000 volt line, and in view of that, I don't see any reason why we can't put our 20,000 volt wires on your telephone poles."

Mr. Addis. I wish heartily to concur with the gentleman from Portland in his statement that it is a hard problem for the central station serving a rural community to do so with economy. It is a very pertinent question he raises as to how the central station can run down here three miles to this silo and half a mile to the other silo to supply a small customer 5 or 7½ or 10 horse power. That is one of the greatest drawbacks the manager has confronting him—the apparent impossibility of securing this desirable class of business economically.

My experience has not been very great in the rural line. Still I have two such lines attached to our property. We have one customer whom we might not class as a New England farmer; in fact, we might liken him to Mr. Martin, who has, as he said, a little farm in the Berkshires in which he takes great pride. In my locality we have a gentleman from New York City. He takes great pride in a farm he has located somewhere in the neighborhood of five miles, possibly a little less than that, from our central station. He wanted electric service. Of course, he didn't hesitate to expend a thousand dollars to get that service. We met him part way by building our line on the highway to such a point that he could take it from the highway across lots over his own property to his farm buildings. He cut down the expense greatly by having the poles on his own land. He had his farm labor cut the poles, ascertaining, of course, about the right dimensions from the lighting company and such other information as was needed to set them. Our linemen took charge of stringing the wire, placing the cross-arms and installing the transformers. That made it easy for us. We only had to extend our lines along the highway about a mile and a half. We found that little mile and a half of line paid us a good income, as this gentleman farmer's installation brought us in anywhere from $75 to $80 a month.

But that is not what we want to get at. What we want is information as to how the central station can afford to run its feeders out and tap little these farms. It has occurred to me that where a farm is located along a prominent highway, a turnpike or county road, leading from one locality to another, where the travel is fairly dense, it might be possible to induce the town authorities to put a few street lights along that thoroughfare, perhaps, making an extension from the lighting limits a little further out into the country. That would help to overcome some of the expense of building a line to tap the farms in that section.

I believe, however, that the average central station man whose station is situated in a farming district is handicapped a little more than my friend, Mr. Carpenter, thinks they are. He happens to be located in a portion of the country where truck gardening is carried on extensively. This class of farmers are invariably prosperous. They have a ready demand for their products, which are easily disposed of, and there is no question that they are up to date. They are good business men. They are hustlers. But they don't typify the average farmer that we fellows up in New Hampshire and Vermont and Maine have to deal with.

As to the economies, perhaps I am not sufficiently posted to be able to speak with authority on that phase of the matter. But I had a conversation with one farmer on our line—he has a 7½ or a 10 horse power motor, I forget which—about two months after the motor had been installed as to the service it was giving him, and he said: "That motor? Why, I wouldn't be without that motor for five times what it cost me. Just this past month alone it has saved me the labor of 14 men in filling my silo." He brought up another point which is a very good one, also. He said: "Previous to this I have been hiring the gasolene engine owned by my neighbor. Now, he comes to my place and stays two days. It takes 14 men to keep the machine going. I get my silo filled to the top in two days, and then he goes on perhaps a couple of miles to the next place. By that time my ensilage has shrunk and gone down perhaps ten feet. I have to go and get Mr. Gasolene Man back again to fill that space. Perhaps I can get him and perhaps I can't. If I can't, my silo is operating at only 75 per cent. of its capacity, and if I can, I am paying him more in proportion than I think I ought to pay. With my motor I can fill the silo today and go on about my business. Tomorrow, if it has gone down, I can fill it up again, and keep that going until I have got it plumb full." That is one of the conveniences of electric drive as applied to the silo which he had experienced.

I think this paper covers the farm question in a very able way, and I think it is a question that has come up at a very good time. Education at the present time seems to be a mighty attractive subject, both with our New England Section and the National Association. We have got to educate the contractor, the central station manager, the jobber and the manufacturer, and now we have to educate the farmer. And I believe it is a mighty good thing to educate us all, and if it is possible to get us all working together for mutual benefit, it will be a grand thing accomplished.

MR. CARPENTER. I should like to say in answer to Mr. Fleet that several years ago I put up an iron line. As far as I know that is still in operation. It is to be noted that the greater tensile strength of the iron wire enables you to use 30 to 50 per cent. fewer poles and insulators, and where you find a line that is not going to be loaded very heavily, this construction is feasible. We would have used it in our territory. But we are up against another proposition there—salt air. Near the ocean severe storms bring a great deal of salt mist in the air, and it is very destructive to iron. Transformer cases and that sort of thing don't last well with us. And so we are unable to use the iron line as a solution. But I think back from the ocean, in developing this rural territory, iron wire lines would be a very good thing.

THE PRESIDENT. This is a very interesting subject, but the time is passing rapidly and I am afraid we will have to go on to the next paper, "Illuminating Engineering for the Central Station Salesman," by Mr. R. Beman of the National Electric Lamp Association of Cleveland, O.

ILLUMINATING ENGINEERING FOR THE CENTRAL STATION SALESMAN.

By Ralph Beman.

National Electric Lamp Association, Cleveland, O.

The term Illuminating Engineering I wish to use in a broad sense, meaning the application of the laws and principles of the various sciences involved, to practical problems in lighting. Let us consider what illumination engineering a central station solicitor, or salesman, as I shall call him, can use to advantage in his own work. The salesman, whose duty is to sell the various kinds of service his company affords, cannot be expected to become an expert "Illuminating Engineer," at least as that term has been sometimes defined, but, it is obvious, he may utilize the same kinds of information as the illuminating engineer who deals exclusively with lighting problems.

Merely to indicate the range of the salesman's usefulness in illumination matters, one might point out his functions and probable limitations in different fields.

In the residence business, the salesman is one of the few men in a position to advise or inform the customer as to what he may expect in electric lighting. He must, of course, be acquainted with lamps, the different sizes, candle-powers and wattages, costs of operation and other purely practical data. Information of the latest developments in lamps should be placed in his hands so that he may be able to give the customer the most for his money, insuring satisfaction and cordial relations with the central station.

In a residence one would rarely be called upon to design an installation for uniform illumination, but efficiency of light production does concern every householder. He may be ignorant of the fact that he may have lamps in, say, all four sockets of a "shower" fixture and not increase his power bill over that now required to operate the one carbon lamp which he uses every day, turning on the other lamps only on festive occasions. He may not know that through the adoption of high-efficiency lamps he can afford to use the denser and deeper tinted shades which appeal more to his artistic taste. A suggestion as to a simple and easy reform in the lighting of the kitchen will surely be appreciated. I know of a case where five kitchens were brightened following the installation in one of them of a single tungsten-filament lamp with reflector mounted at such a height as to eliminate troublesome shadows.

As for store lighting, the salesman can utilize almost any quantity of illuminating data. The larger establishments we will consider as not in his field, being in the particular care of the architect, or the illuminating engineer, either within or outside the company. But the ordinary stores, of which there are so many on the station's circuits, need something better than a haphazard lighting layout. The merchant usually wishes to equal or outdo certain other store installations, which have struck him favorably. A knowledge of the intensity or wattage required, spacing and height of units, fixtures and glassware available, puts the salesman in a position to make a sketch while on the ground and take the measurements. A workable pencil drawing, plus a close estimate on cost of wiring, fixtures, lamps, etc., together with approximate operating expense gives the salesman a definite proposition to put before the customer.

In the lighting of factories it might seem advisable to have the designs worked up at the office, but there are plenty of opportunities for any representative of the company to make helpful suggestions leading to greater satisfaction. In competition with gas or other non-electric illuminants carefully compiled comparative costs are valuable. These costs should be based on actual illumination obtained under working conditions. Cost comparisons should be very carefully worked out using the prices then in force in the community considered.

Where churches and public buildings are involved the details of design would fall outside the field of the solicitor. Cost figures on similar installations and a general idea of fittings and glassware would assist in leading up to the final closing of the deal.

ADVANTAGES OF ILLUMINATING ENGINEERING BY SALESMAN.

For many kinds of work field illuminating engineering has marked advantages over the system by which measurements are made at the job and sent in for plans to be worked up at the office.

First—There is the matter of speed. The man on the ground can have a simple lay-out completed and all parts specified in less time than it usually takes to get the necessary information to the designer. Insufficient notes often need to be elaborated requiring a second trip and attendant loss in time.

Second—There is less likelihood of error. It is extremely easy to leave out some detail of construction in making notes, which omission may lead to a design wholly impracticable from the standpoint of wiring or artistic appearance. The designer if he sees with his own eyes the color of walls and furnishings, location and nature of goods displayed, etc. can apply his experience factors better than the man who is simply told 'light ceiling, medium walls."

Third—The installation is made to comply more closely with the customer's wishes. The salesman has probably a better idea than any one else as to what effect the buyer really wants. He has his own first-hand judgment of the approximate expense to which he will be willing to go.

Fourth—Field engineering facilitates sales. The prompt laying before him of a definite plan at the psychological moment gives the customer less opportunity for changing his mind after once convinced.

KNOWLEDGE REQUIRED.

The illuminating knowledge that a salesman should have depends upon the company's policies and the salesman himself. Where the company sells nothing but electrical energy, and leaves to the trade the sale of lamps, fixtures and all current-consuming devices, the salesman will be satisfied with a general knowledge covering description and cost of accessories. If the company sells its own fixtures, shades, etc. the salesman should be familiar with those particular lines in greater detail. Solicitors differ so much in their methods that where one may succeed with little technical data to assist, another may make his strongest arguments backed with "straight dope."

DATA ON ILLUMINANTS.

Data on illuminants would include wattage, candle-power, physical size and shape and prices of incandescent and arc lamps. Operating costs, especially where the company has a maintenance service, should be included. The salesman should know the relative desirability of different kinds of illuminants, as loads on the company's circuit, involving questions of power-factor, starting current, etc.

DATA ON ACCESSORIES.

Data on accessories would include appearance, sizes and costs of reflectors and shades of prismatic, opal and silvered glass, enameled and aluminum finish steel, etc. Fixtures should also be included.

DATA ON ILLUMINATION DESIGN.

The natural starting point for the design of any installation is the required intensity of illumination. Practice has settled these values within certain limits for the different kinds of service. These figures should be modified according to local conditions, competition between neighbors or with other illuminants, etc. In general, they may be considered as representing minimum satisfactory value. It remains to be determined just how much they may be raised with true economy.

The following table may be considered as representative.

TABLE No. 1.

TABLE OF FOOT-CANDLE INTENSITIES RECOMMENDED FOR VARIOUS CLASSES OF SERVICE.

Art Gallery (walls)	5.0
Automobile.	
Showrooms	5.0
Billboard	8.0
Bowling Alley.	
Alley	1.0
Pins	4.0
Runway and seats	1.5
Card room (tables)	3.0
Courts.	
Tennis	7.0
Drafting room	8.0
Factory.	
General lighting (where individual drop lights are provided)	1.5
General lighting (where no individual lights are provided)	4.0
Local bench illumination	4.0
Gymnasium	2.5
Hotels.	
Bed room	2.0
Corridor	1.0
Dining room	2.0
Lobby	2.0
Writing room	3.0
Library.	
Stack room	1.5
Reading room (with no local illumination supplied)	3.5
Reading room (with local illumination supplied)	1.0
Office.	
Desk	4.0
General (no drop lights)	4.0
General (with drop lights)	1.5

Show Window.	
Dark goods	20.0
Light goods	12.0
Store.	
Clothing	6.0
Furniture	3.5
Grocery	4.0
Hardware	3.5
Shoes	4.0
Warehouse	1.0

Having decided the average intensity, which in turn determines the total light flux on the plane considered, the next step is to find what the total flux generated by the lamps must be. This depends upon the efficiency of the system or the ratio of lumens effective to lumens generated. Utilization efficiencies for different systems of light may be considered approximately as given in Table II. These figures have been compiled with the idea of being representative of results which may be obtained with new reflectors and lamps operating at rated efficiencies.

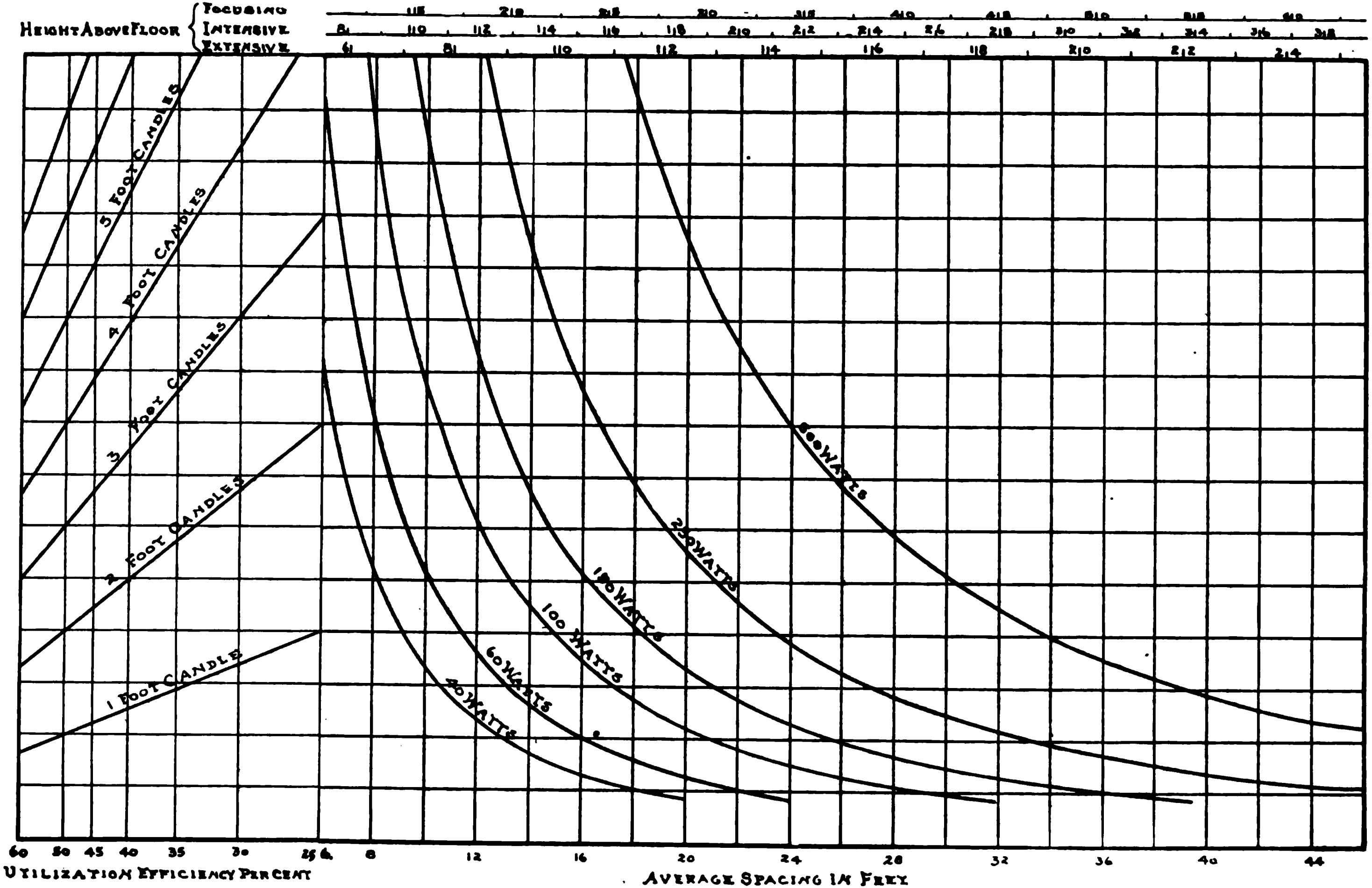
TABLE No. 2.

UTILIZATION FACTORS.

		Walls	
Unit	*Light*	*Medium*	*Dark*
Prismatic Glass	60	50	40
Opal or Milk Glass	50	42	33
Decorative or Art Glass	30	25	20
Semi Indirect	40	35	30
Indirect	Average Value	30	

	Wide Angle	*Narrow Angle*
Steel*	58	50

(*)Values for steel will vary 10% either way depending upon conditions. They hold only when ratio of mounting height to smallest dimension of room is not greater than 1 : 2.


HEIGHT ABOVE FLOOR
FOCUSING
INTENSIVE
EXTENSIVE
15 20 25 30 35 40 45 50 55 60
8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38
6 8 10 12 14 16 18 20 22 24
5 FOOT CANDLES
4 FOOT CANDLES
3 FOOT CANDLES
2 FOOT CANDLES
1 FOOT CANDLE
500 WATTS
250 WATTS
150 WATTS
100 WATTS
60 WATTS
40 WATTS
60 50 45 40 35 30 25
UTILIZATION EFFICIENCY PER CENT
6 8 12 16 20 24 28 32 36 40 44
AVERAGE SPACING IN FEET

Having determined total lumens to be generated the selection of size of unit and spacing can be made. Then, depending upon the distribution from the reflector, the hanging height should be fixed.

To facilitate some of these details I have designed a chart as shown in Fig. 1. The use of the chart may be illustrated by an example. Assume a store requiring an illumination of 3 foot candles and that prismatic glass reflectors are to be used. With medium walls we may take the utilization efficiency as 50 per cent. Using the left hand portion of the drawing we find the vertical line corresponding to 50 per cent efficiency and follow it upward till it intersects the oblique line marked 3 foot-candles. If we follow the horizontal line passing through this intersection, over to the other portion of the drawing we find it intersects the curves representing the several units in as many points.

The abscissæ of each of these points gives the spacing necessary to obtain the given intensity with each unit. In the case in hand, 40 watt lamps should be spaced at intervals of 7½ feet, 100 watt units at 12 feet, 500 watt units at 28 feet. The size of unit will be determined by the size of room and diffusion desired. The proper height above working plane can be read from the upper scales. The narrower or wider types of distribution will be chosen according to the ceiling height.

The use of the two tables and the chart enables a salesman to specify size, spacing, height of suspension, and light distribution from the unit, which in cases of uniform illumination is usually sufficient.

SOURCES OF INFORMATION.

Naturally, I mention first the Solicitor's Handbook published by the Association. This has a comprehensive chapter on illumination and valuable material compiled in tables. Rapid progress in new lamps makes it necessary to revise and supplement information from time to time from manufacturers, bulletins and catalogs. Trade literature is particularly valuable in giving the electric and photometric data necessary for proper design. The technical journals can be put into the solicitor's hands at small expense and they may be read at such hours as it is impractical to solicit business. What may be made the most valuable book of reference is doubtless the salesman's own note book. Tables and charts which he himself has worked up and which he therefore understands are the most likely to find ready application.

ADDITIONAL ADVANTAGES.

The solicitor or any other employee familiar with lighting details can prove of great value, being watchful of all kinds of lighting installations. He will note perhaps that in a certain store lamps are not renewed when they should be, or that reflectors are dirty, or that the reflectors in the show windows are not properly placed and can accordingly advise the customer how to get better service. He may also observe in the case of a competitive installation, the frequent outages or unsatisfactory operation of the lamps and thereby obtain talking data, or indeed choose a favorable time to approach the prospect when he feels the greatest need for reliable light.

In conclusion, I may say that the salesman will find the fundamentals of illuminating engineering not only *valuable* in increasing his efficiency but *essential* to his usefulness in dealing with a public which is rapidly becoming educated to the value of engineering in lighting.

MR. GALLAGHER. I wish to say a few words on the paper, and my remarks will be from the viewpoint of the salesman himself rather than from that taken by Mr. Beman in his paper. As far as I am concerned—and I think the same is true of many others—I view the paper Mr. Beman has given us as one presenting in a comprehensive way all that we might do in order to make ourselves the ideal central station salesman. At the same time, I think it is more in the nature of the ideal than the practical. What I mean is this, that according to my interpretation, the paper of Mr. Beman's recommends that each and every installation be handled on a strictly scientific basis, utilizing the principles of illuminating engineering, figuring out the flux, lumens or watts per square foot and candle feet necessary for proper illumination. Personally, I do not think it is at all necessary.

The average central station salesman is, or should be, familiar with the fundamentals of illumination. He knows about how much ground a lamp of a certain type will cover under certain conditions, and I think he can readily determine from past experience what to use and how to apply it for any ordinary problem he has on hand—because it is already understood that he does not as a general rule handle the larger and more complicated problems.

Sometimes it is necessary to reduce a lighting proposition to a scale drawing and to provide specifications for the work. We have had to do it in our own office, not only figuring it out in the manner that Mr. Beman has suggested, but we have gone even further, in that we provided wiring specifications, secured bids on the work, let the several contracts in connection with the work, superintended the installation of it and O. K.'d the final bills. That, however, was a special case and involved a large department store so that the results justified the work.

In the ordinary case, as for instance the average store, as I have before remarked, past experience will probably solve the question of what to use. If it is a situation that has not heretofore come before the man, I think a simple demonstration, where service is available, will do more real good than the submitting of elaborate plans and specifications of the work.

That part of the work takes time, a great deal of it, and for this reason, I personally do not encourage requests for the scientific exposition of the principles of illuminating engineering for the average installation.

I have never seen the justification for spending a great amount of time on what might be termed engineering work.

Speaking of my own case, and that of my fellow workers in the Narragansett Electric Lighting Co. from the standpoint of efficiency, as we understand that term today, when our costs are figured on a cost per K.W.H. basis for all new business secured, we feel that the energy and time spent on engineering work ought to be connected with something more worth while than the average installation. Every hour put in on engineering work means a corresponding loss of time in our search for new business.

With the possibility of an increased cost per K.W. because of close adherence to engineering principles along the lines laid down, we feel that all our efforts should be confined to the large installations where the connection and the income justify the time.

MR. BEMAN. I agree with the gentleman who has just spoken that there are many installations in which the drawing up of formal plans, the obtaining of bids and the making of specifications are not justified. I know of a central station that at one time made up some beautiful drawings, even finishing in tint, for their prospective customers. I believe that practice has been abandoned, although it did make a good impression on the customer to be shown something definite and attractive.

But I think there is always a field for using more or less of this material on illumination. In the report of the committee on competitive illuminants read before the National Association at the Seattle convention, I find these words: "Where competition exists, the salesman should exercise more than usual care to see that the system he recommends is not wasteful and that the wattage he deems necessary is distributed to the best advantage."

That merely means that if an installation is to be installed in competition with some other type, a considerable amount of care must be given to the design—more care, perhaps, than would be given where the salesman simply referred to his past experience, considering that a light of a certain size will light about such an area to an intensity equal to that in Mr. So and So's store. The chart I showed was to make the problem simpler and quicker of solution. As I have said, each salesman can go as far as he likes in application of illumination data; the data can serve as a check on any design based solely on the salesman's ordinary judgment.

The convention adjourned till 2.30 P. M.

AFTERNOON SESSION, THURSDAY, OCTOBER 17.

THE PRESIDENT. The paper for this afternoon is by Mr. J. M. Tomb of Boston on "Co-operation between the Central Station and Motor Manufacturer."

CO-OPERATION OF CENTRAL STATIONS AND MOTOR MANUFACTURERS

WITH REFERENCE TO DEVELOPING INDUSTRIAL MOTOR FIELD.

BY J. M. TOMB.

Westinghouse Elec. & Mfg. Co.

Not many years ago central stations were operating only during evening hours, furnishing small amounts of electric power for illuminating a few stores and homes.

The attitude and tendencies of the public have been continually changing, until today central station power is supplied to haul trains over some of our largest railroads, and to turn the wheels of such great industries as the textile, paper, and steel. With the long extended transmission lines central station power is found in remote places operating stone quarries, lumber camps and irrigation fields. Witness this vast growth.

During the past few years the public has shown a marked tendency toward using electric power for all possible purposes. It has passed through a process of education which has established the fact that electricity is a commodity of our daily life. This result has been accomplished through the untiring efforts of the central station industry in gaining the public confidence, and in bringing before the public attention the distinct advantages electric power and electrical devices offer. With the same end in view, some of the larger motor manufacturers have conducted national advertising campaigns through the popular monthly and weekly magazines, reaching millions of people.

Some wonderful developments have been witnessed on the part of central stations in their physical growth to meet the increased demand for electric power. The electrical manufacturer has passed through a similar stage in designing and manufacturing suitable apparatus.

With the rapid growth of central stations and the increasing demand for electric power, central stations can co-operate with the manufacturer in using standard apparatus if it will meet the requirements. The standard apparatus of today is the result of the best thought of the designer, the best skill of the factory and experience combined, hence the acceptance of standard types and sizes of motors will, in the long run, bring to the central station better and cheaper apparatus.

Today, approximately twenty per cent. of the industrial establishments in the United States use electric power. It is evident, therefore, we have not even approached the peak of our possibilities, but the most difficult work is before us. An analysis shows a large per cent. now served by central stations, for commercial purposes, represents a class which is not in very close competition with an isolated plant, that is, power can be purchased at a lower rate per K.W. H., than manufactured in an isolated plant. Very frequently the power prospect is reluctant to accept this fact, claiming certain changes in his factory, introducing economies suggested, are impossible with his class of product. If evidence can be produced showing where a central station is furnishing power to a customer engaged in the same industry, the attention of the doubtful prospect is usually secured. The evidence is best produced by means of a condensed report, stating the specific conditions under which central station power is used. The report should give industry, men employed, connected load, maximum demand K.W.H. per unit of product, motor application, K.W.H. consumed for a period of one year or more, and important details incident to the installation.

The company with which I am associated has recognized the necessity for having available this evidence, and has consequently co-operated with a large number of the central stations of the United States in collecting and preparing data of this nature, covering a very large number of industries. With this data available, the central station industry is better prepared to co-operate with the power problems and educate the public to the use of electric-motor drive, using central station service.

The use of this data aids the power engineer with his work in selecting the proper size motor for a specific duty, also the operating department, in that the proper motor is selected which will operate at or near full load, corresponding to a good power factor.

Broadening the scope of central station power in industries such as large textile mills, paper mills and rubber mills, the power engineer finds more intricate problems relating to proper motor capacity, speed and mechanical arrangement with respect to driven machinery. Many propositions involve consideration of exhaust or live steam in manufacturing processes, resulting in the central station rate appearing less attractive.

The cost of electric power is a small part of the total cost of production, and yet it may contribute very largely to successful operation. The cost of power in most industries is only one and one-half to three per cent. of the total cost of the product, and the cost of lighting is less than one per cent. If, through a special class of engineering, the arrangement of machinery and routing of material, or a special motor application to a loom or spinning frame, paper or rubber calender should produce an increased production of, say, eight to ten per cent., the power prospect could well afford to pay double the cost of producing power under the existing methods.

In order to apply the proper engineering, a special type of engineer is essential, who may be termed "application engineer."

These engineers have done a great deal to advance the industrial and commercial position of this country, for the cost of production of many lines of articles has been reduced through their careful analytical studies. They have been able to reduce the cost to the consumer in many instances and yet increase the profit to the manufacturer.

There are comparatively few skilled men of this type, and extended experience is rare because this field of work is so new. In one sense this kind of engineering calls not merely for the individual engineer, but for a comprehensive organization. The field of application is so wide, the data necessary so varied and must be secured from so many places and under many different conditions, that comprehensive-application engineering is beyond the capacity of a single engineer. A man can be a specialist in only a few lines. Comprehensive and application engineering makes essential a fund of accessible data drawn from experience and records derived from many sources. This is obviously beyond the range of the individual engineer or operating company, but is a matter which has been taken up by some of the larger motor manufacturers in order that they may adapt their product to service requirements and that they may lend valuable assistance in the installation of motors.

There are diverse methods of co-operation between central stations and electrical manufacturers. It is not the object of this paper to cover the entire scope of co-operation, but to cover some of the more pertinent results from co-operation in the development of the industrial-power field.

Mr. S. Fred Smith. I shall not undertake to add very much to what Mr. Tomb has said in his paper, or to pick it apart, because he has touched on all of the valuable points in regard to this motor question. There is no doubt in my mind, however, that a great deal more could be done in the installation of motors and the promotion of the motor service if the central station would co-operate somewhat more with the manufacturers.

In our experience we have found that the ordinary lighting solicitor is not placed in a position, or has not the time, to investigate the situation thoroughly enough to undertake to solicit for power. I believe the power solicitor should be unhampered in his work, that he should be given full authority to investigate the power plant at every factory in the city and that he should give his entire time to the promotion or sale or use of electric motors. We have found that so in our case.

Our power solicitor uses a card catalog. He knows every steam engine there is in town. He knows the requirements of every manufacturer. He takes the readings from the manufacturer's engine in order to see how much power is being used and in what way the power can be applied. I feel that that is the only way, the only thorough way, to go into this power campaign. Further than that, every power solicitor should become acquainted with the manufacturers of motors. Improvements are being made on this type of apparatus continually, and unless the solicitor has frequent access to the factory of the manufacturer, or to the office of the concern, he cannot keep in touch with what is going on, and as a result he cannot keep the public in touch with the changes that are constantly taking place in the motor line.

Furthermore, I believe the motor man should be available for the promotion of the electric vehicle. There is a very fertile field that has not been scratched, and I find in our experience that the man coming in touch with motor promotors is having good success in the motor vehicle line. So that there are very many opportunities for the motor solicitor to promote the use of electric motors. And I firmly believe that if some of the central stations would consider that matter more thoroughly, and divorce lighting solicitation from power solicitation, they would be more successful in getting motor business.

MR. BURLEIGH. I wish to congratulate the New England Section, the art as a whole and Mr. Tomb in particular on this paper, as well as on the subject selected, as it shows a growing appreciation of what has always been the attitude of the concern which I represent toward the central station industry to the effect that on the success of the central station much more than on the success of the isolated plant depends the growth of the art as well as the success of the manufacturer.

On the first page of Mr. Tomb's paper he states:

"With the rapid growth of central stations and the increased demand for electric power, central stations can cooperate with the manufacturer in using standard apparatus if it will meet the requirements."

I feel it should be the duty of the manufacturer to investigate and study the requirements of the customers and possible customers of the central station to the extent of standardizing such apparatus as will best facilitate the business of the consumer by either improving the quality or increasing the volume of his product, as by this means the interests of the consumer are best served as are also those of the central station.

With this object in view, the company with which I am connected has always employed specialists who are thoroughly conversant with the desired results to be obtained in all the different manufacturing industries and their services have always been available for consultation and advice for the promotion of the interests of the central station without expense to them.

On the second page I heartily agree with the writer in a part of his statement to the effect that—

"Analysis shows that a large percent now served by the central station represents a class which is not in very close competition with an isolated plant. That is, power can be purchased at a lower rate per kilowatt than manufactured in an isolated plant."

I would however, like to put this statement in a little different form as follows:

Analysis shows that a large percent now served by the central station represents a class to whom the advantages to be derived from purchased power are apparent, either due to lower rate or local conditions. In other words, a class who has largely become customers of the central station of their own volition or with little solicitation.

We all appreciate I think, the fact that too much importance is attached both by the consumer, the central station and the manufacturer to the price per kilowatt hour of purchased current. The first to criticise it is the consumer and the low price makes the central stations representatives' work easier, and we are all prone to laziness.

In dealing with any prospect of either the central station or of the manufacturer, in nine cases out of ten, the first question asked is—"What is the price?" I have been selling goods some years and may be credited with having had experience enough in this line to give some weight to the statement that the purchase price of current or apparatus is of almost negligible importance as compared with performance as is emphasized by the writer of this paper on page 5 where he says:

"The cost of electric power is a small part of the total cost of production."

Ranging from 1½ to 3% of the cost of the finished product. Put into figures, in an industry producing goods representing say a total sales price of $50,000 per year at a profit of say 10%, representing a cost of production of $45,000.

Now a power cost of 3% on this production equals $1,350.

Let us assume that the adoption of the electric drive does not save a cent; the interest and depreciation on the investment due to its installation just balancing any saving effected, and we have a hundred and one arguments in its favor, among which are cleanliness, flexibility, better utilization of manufacturing space, independent operation of departments, etc., and most important of all, increase in production.

And here let me make another statement without fear of contradiction, to the effect that I have never seen the electric drive properly installed in any manufacturing establishment where the production was not increased from 10 to 30%.

Let us consider the lower increase (10%) and apply it to our hypothetical case. 10% of $50,000 is $5,000 more goods sold at a profit of 10%, which is $500 additional profit which we have gained without saving a cent on our power cost.

Now let us for example manufacture clothes pins. (I do not think of any manufactured goods where the cost of power bears a larger proportion to the finished product than clothes pins.) This manufacturer knows nothing about power production on an economical basis, but he can produce a good clothes pin as he is thoroughly familiar with its manufacture. It is going to cost him $1,350 to produce his own power. Or he could buy it of a central station at a price which represents a 20% increase over what he could produce it from his own plant. 20% of $1,350 equals $270. By spending this $270 additional for power however, he has been able to increase his profit $500, therefore he has gained by the difference between $500 and $270, or $230, besides saving all bother in connection with the design and operation of the power plant, thus allowing him to devote all his energies to his legitimate business (the manufacture of clothes pins.)

But you say, "Why couldn't he have obtained the same added production under the same conditions from his own power plant?" So he could if he did not have to make any investment in power plant.

Let us discuss this situation a moment, taking the foregoing figures as a basis. His current bill of $1,350 plus $270 amounts to $1,620 per year. At five cents per kilowatt this represents a yearly consumption of 32,400 K.W., and on the basis of 3,000 hours' operation per year, represents an average consumption of eleven K.W. per hour. Due to poor load factor in a wood working establishment this would require the installation of a plant of at least 20 K.W. capacity either in one or two units, and roughly would require an investment of from $2,500 to $3,000, which if put into producing machinery would produce more than enough clothes pins to result in our $500 additional profit.

The foregoing figures apply to a manufacturing industry where cheap goods are produced. Where a finer grade of goods is produced such as silk, cloth, high-grade jewelry or any expensive commodity, the difference is even more marked in favor of purchasing power, due to the fact that the cost of power bears a much smaller proportion to the value of the finished product.

I will call your attention to the fact that I have in the foregoing figures taken the maximum percentage of power cost and the minimum increase in production and used the manufactured product of the least value where the power cost is the highest in proportion to the value of the product, thereby evidencing the fact that this argument is stronger the higher the grade of the goods under consideration.

I feel that the foregoing substantiates the statement which I have made and which I wish to leave with you for consideration, that—The purchase price of current or apparatus is of almost negligible importance as compared with its performance.

MR. ST. JOHN MORGAN. It must be evident to all of us here that the fundamental purpose common to electrical manufactures and central stations is the acquiring of profit. It is also evident that the success of securing such profit by the motor manufacturer and by the central station is based on one common element, and that is the sale and consumption of current. The motor manufacturer cannot secure profit unless electric current is consumed. The central station occupies the same position.

The motor manufacturer, with whom I have the privilege to be associated, has been conducting a national advertising campaign in many of the popular magazines, and in a number of daily newspapers, with the idea of inducing the public to buy electric current through the use of current consuming devices. The endeavor has been to get the people of the United States to think electricity, to regard electricity as a commodity of their daily life, just as they regard water coming from the faucet,—something that is necessary in their homes. And if that state of mind can be brought to its maximum intensity, will result in profit jointly to the motor manufacturer and to the central station.

There is an aspect on the general subject of co-operation between central stations and motor manufacturers to which I would like to call your particular attention, or rather to emphasize it, as it has been touched upon in the previous discussion.. I have in mind a certain phase of efficiency engineering as affected by electric motor applications.

It has been the tendency, I believe, in the past, both of central station power solicitors and of some motor manufacturers to emphasize the cost of power, which, as a matter of fact, when compared with other considerations, is of minor importance. In a good many industrial establishments we find that speed, and not power, is the important item. For years power has been scrutinized closely; but speed and its uniformity is of paramount importance. Buildings are erected, machinery purchased, and operatives employed at large outlays of money. To get maximum returns on this investment, it is essential that it be kept operating at maximum capacity, and this means a certain speed of operation, possibly not a maximum speed, but certainly a definite one, to go above or below which means a loss. That power is used to produce this speed is a mere incident. The speed is the thing. Many industrial establishments, driven by engines or water wheels with long shafting arrangements, are failing to secure at the productive machines any degree of uniformity of speed. As is generally known among the electrical fraternity, electric motor drive, with its possibilities of segregation of machines into groups, or even applied individually, will result in uniform speed.

Knowing these conditions to be true, the motor manufacturer, by reason of his large experience in the application of motors to a vast variety of industrial establishments and individual machines, is able to aid the central station in securing a power prospect, not so much on the score of cost of power but on the score of results in the nature of quality and quantity of product, which could be obtained by the change over to electric drive.

The central station in a given city has to deal with a large variety of industries, possibly with few of the same character, and it is well nigh impossible for the central station power man to have secured the experience pertaining to each particular industry. At this point the motor manufacturer can come in and bring to bear on the specific problem the results of an experience extending over a large number of cases.

Mr. Boyden. I think Mr. Tomb's paper is a subject for a great deal of discussion. I am sorry he did not carry it further. I think all will agree that we need better co-operation between the motor manufacturer and the central station power agent. One thing that impresses me very strongly in working jointly on this problem is the starting characteristics of the motor—I am referring specifically to A. C. motors—and the power factor. The personal element has much influence on the prospect's mind in selecting the motor, and the manufacturer is naturally inclined to sell as many dollars worth of apparatus as possible, while the central station in either event sells the minimum amount of current to provide a satisfied customer.

With motors too large or over-set in power, the company is immediately penalized, and in many of the smaller companies they are very much disturbed when motors of heavy starting current are installed on circuits of limited capacity. I think if the manufacturer would only get a little closer in touch with the central station, and forget for the moment the amount of his sale and get a little nearer the required amount of power, it would be better. I should like to have had Mr. Tomb take up this subject in his paper, because I think it would have opened up a very interesting discussion. I hope to hear from some others on the same line.

Mr. Fleet. I am something like the Irishman's pet parrot—I think I talk too much. But the last speaker has referred to the manufacturer not being very fussy about the size of the motor he installs on any customer's premises. I am glad to say that is not altogether my finding. The manufacturers today are a good deal more anxious to install the right size motors and motors that will be satisfactory to the central station than they were five or ten years ago. I haven't found that the manufacturer is so anxious to sell a motor as he is to get returns into the central station. As one manufacturer explained it to me, "Anything we can do to advance the interests of the central station is naturally going to advance our interests. If we can load up a man's plant and load it up in the right way, the time is coming very shortly when you are going to have to sell him another generator. That is what we are after." I haven't found a single manufacturer who was anxious to sell a 15 horse power motor when a five or a ten horse power motor was sufficiently large. That has not been my experience. Perhaps I am one of the favored few, but I hope not, because it is a case of co-operation today. We must co-operate wherever we can. And the manufacturers are co-operating with the central stations—at least they are with my central station. I am glad to acknowledge it.

I also want to say a word for the manufacturers as to the interest they have taken. I have never called on them for help but they have literally tumbled over themselves to come and help me in any way they could. They have sent the best they had and done the best they could in every case. I am not a manufacturer's agent, or speaking for any manufacturer in particular, because every one of the agents knows that Fleet buys where he can get the cheapest and best results.

Mr. D. S. Boyden. I appreciate that there is a great deal closer co-operation now than existed five or ten years ago between the central station and the motor manufacturer. But motors slide in of larger size than are required. If the prospect has a great deal of confidence in the salesman, a little quiet tip that a 7½ motor will be better than a five, generally brings a sale. The reference that Mr. Fleet made regarding the generators we buy from the manufacturer in place of motors is very logical. They know we will buy their generators when they load us up with motors. But 5,000 kilowatts in a prime mover generally calls for 10,000 horse power in the motors, with the cost something in the relation of $40 per K.W. for generators and $90 per K.W. for motors. So you can see that it may still be selfishness on the part of the manufacturer. I do not contend that it is. But I claim that here is where the manufacturer should co-operate with the central station a little more closely.

Mr. Day (Malden Electric Company.) I am heartily in accord with the author of the paper and the gentlemen who have just spoken in regard to the necessity of close co-operation between the motor manufacturer and the central station. Our experience has been that they have always been willing to co-operate with us. Of course, there are times when differences arise especially in the coming of a new salesman in the field; he will overstep the bounds because he is not familiar with the arrangements between the companies and the manufacturers and is anxious to make sales. I think it is the duty of the central station man so to protect his field that these conditions cannot arise. If a man is installing a motor in his territory, surely the central station man must know it before the motor is installed. It seems to me this is the time to settle the question. It is the duty of the power salesman to work along these lines to see that no motors are installed in our territory that are not satisfactory. I think there is no question that when a difficulty of this kind arises, it can be remedied if taken up with the manufacturer.

THE PRESIDENT. If there is no further discussion of this paper, we will now go into executive session, which is open to Class A and Class B members. By a change in our constitution, made last spring, this becomes our annual meeting, and it is our duty, therefore, to elect officers for the ensuing year.

In accordance with Sec. 4 of the constitution, I appointed a nominating committee. Unfortunately that committee has not been able to get together. I shall therefore appoint a new committee, consisting of Mr. Davenport, as chairman, Mr. Boyden, Mr. S. Fred Smith, Mr. Hayes and Mr. Rowell, and I will ask them to get together at once and agree on a list of officers.

We will now hear the report of the auditing committee, which will be read by the treasurer.

REPORT OF AUDITING COMMITTEE.

"We have examined the report of the treasurer and find the same to be correct as reported."

(Signed) A. S. Nichols,
E. A. Barrows.

The President. I regret exceedingly to report at this time the loss to this association of Mr. T. H. Brady, a man I think you all knew and who made many of the street lighting fixtures you have on your circuits. We shall miss him from the industry. I also regret to announce that Mr. Badeau, who wrote the paper on "Electric Protective Devices" read here Tuesday afternoon, died the next morning. It would seem fitting that some one should offer a resolution in regard to these members.

The nominating committee reported the following nominations for officers for the ensuing year:

For President, A. F. Townsend, Woonsocket, R. I.
Vice-President, C. C. Wells, Vermont.
Treasurer, R. W. Rollins, Massachusetts.
Secretary, Miss O. A. Bursiel.

EXECUTIVE COMMITTEE.

H. B. Ivers, Maine.
L. J. Chase, New Hampshire.
A. B. Marsden, Vermont.
L. D. Gibbs, Massachusetts.
E. A. Barrows, Rhode Island.
B. H. Gardner, Connecticut.
J. S. Whitaker, New Hampshire (ex officio.)

The treasurer was instructed to cast one ballot for the election of these officers, and they were declared elected.

The president appointed Mr. Davenport and Mr. Fleet a committee to escort President-elect Townsend to the chair.

Mr. Townsend. I wish to thank you for the honor conferred upon me. All I can say at this time is that I am willing to give all the time that is necessary for the good of the association. Gentlemen, I thank you.

The President. It there any further business? If not, the convention will stand adjourned until 7 o'clock this evening, when we will meet for our annual banquet.

ANNUAL BANQUET, THURSDAY EVENING, OCTOBER 17.

The annual banquet of the Section was held at the Copley-Plaza Hotel on Thursday evening, October 17. The retiring president acted as toastmaster, and brief addresses were made by President Tait and Secretary Martin of the National Electric Light Association. Mr. L. J. Chase of Concord, N. H., brought the after-dinner exercises to a close with a paper on "Readiness to Serve." In introducing President Tait, Mr. Whitaker said:

We who are members of the New England Section are very proud to be an integral part of the National Electric Light Association. And we feel very grateful that sometimes the officers of the National Association will lay aside their duties long enough to come over here and talk to us and show us that they are interested in what we are doing. Ladies and gentlemen, I wish to introduce to you the president of the National Electric Light Association, Mr. Tait of Dayton, O.

President Tait. It is a source of great pleasure to have had extended to me your invitation which enables me to be here tonight. I want to bring to you the greetings and well wishes of the National Electric Light Association, and to let you know how much we appreciate the work you are doing. We want to co-operate with you, so that your business and your section may continue to grow in the future at the same fast pace that it has been growing in the past. We should also like to have your section co-operate with us, because I believe we should co-operate each with the other in order to get the best results.

I remember at the banquet in Springfield last year the ladies were conspicuous by their absence, and I am glad to see that this banquet tonight is a conspicuous success because of their presence. We are very glad to see the ladies here. I don't believe we realize or appreciate, as a general rule, what an important factor the ladies are or have been in the growth of the electric light and power business in this country. I don't know that any one has heretofore given the ladies particular credit for having had anything to do with the splendid strides that our business has made.

The ladies may not know much about the reason for a kilowatt hour, or about the technical or scientific terms of the central station business, but I believe their influence has done much to encourage the men folks to do their best to advance the interests of the electric light and power business. I believe much of the inspiration to do things in the central station business has been largely due to the gentle influence the ladies exert at all times upon the men folks, causing them to do greater and better things, with the result that we have gone on and on and the business has grown to tremendous proportions and is growing faster and faster each year.

It is a splendid thing to contemplate the enormous field of possibilities that is facing us in this wonderful business of ours. And I want to call your attention as a matter of tremendous significance, the facts brought out at a luncheon given by the New York Edison Company about ten days ago, in New York City, at which Mr. Thomas A. Edison was the guest of honor, commemorating the turning on of commercial electric current in New York City thirty years ago,—in 1882.

At that luncheon, at which were present representative men of the electric light and power and its allied business from all parts of the country, was brought out the fact that the electric service had been on continuously, excepting perhaps for six minutes in the first year, during the entire thirty years. The history of the business was reviewed in great detail on that occasion, and the thought came to me and to others who were present that if we had been able to accomplish all the things we have accomplished in the last thirty years, what sort of business and prospects have we facing us in the next thirty years or even in the next ten years of the greatest industry in the world!

It seems to me that we should be proud to be engaged in the electric light and power business. It seems to me this must be the field into which is attracted the greatest talent, and when you stop to think of it, the field is unlimited in extent, and any one can enter it and go as far as he pleases, retarded only by his own intellectual and physical limitations. The industry today is calling loudly for a better and broader type of men. We want the man who can produce a brilliant success, rather than the man who can give us, perhaps, meager results, or average results. This is the type of business, it seems to me, which should make us proud to be connected with it.

With all this possibility staring us in the face, I think we should aim to be more optimistic in the future and to get all the companies to working harder than ever before. I have had occasion during the last few months to consult with some of the leading central station people in the United States, and they all tell me, without any exception in any part of the country, that the electric light and power business is in better shape today than it ever was before. We are perhaps on the eve of the greatest development of the electric light and power business that has ever been known in the history of the industry in this country. I believe that within the next three years, perhaps less, we will be able to show by the work we will have done that we have surpassed the best efforts of any company in the past five years.

I think we should be glad that this is the case. I believe it is particularly appropriate that the New England Section of the National Electric Light Association should have selected this time to hold its convention in Boston, particularly in view of the fact that you have this splendid electrical show in progress here. It seems to me the city of Boston is to be congratulated on having this splendid show here, and also that it is to be congratulated on having the New England Section meet here at this time. I believe Boston is to be congratulated on the magnificent public utility doing business in this locality, locally known as the Edison Electric Illuminating Company of Boston, which has so long and so well served this community at a fair price—not only Boston but the suburbs adjacent for miles around.

I have understood that it is due entirely to the energy, alertness, resourcefulness and co-operation of the Boston Edison Company that this wonderful exhibit you have up the street here has been at all possible. I think that every New England lighting company owes the Edison Company of Boston a business debt of gratitude. And if you want to do the best thing by your companies and your districts, it is your business to go home and try to induce every one of your customers and others to go to Boston and see this wonderful electrical show. If you do this, it seems to me you will be in a position to use the electrical show to impress upon your customers and those who should be your customers the wonderful facility with which electrical current may be used, and you will also prepare yourselves to sell more current as a result of a greater use of economical and labor-saving devices. In my judgment, the whole result of your meeting here and having this show here will be to give greater impetus to your business.

All these things cannot do other than improve public sentiment toward the use of current consuming devices, and that is what we are interested in. The more we can get the public to understand what they can do with electricity, and how easy it is to do things normally unpleasant to do, if we do them by electricity—the quicker that can be inculcated into the public mind, the quicker we will be able to reach the maximum business.

I don't believe that we are going to reach the saturation point for some years to come. We do not know what the saturation point is, and if we did know we might not exert the energy we are now exerting. It is a great sign to see the electric light and power business developing in the way it has been developing in the last two or three years, and particularly the way it is expected to develop in the years to come.

It seems to me the officers of your section are to be congratulated on the wonderfully good convention you have had here this week. I understand the papers and reports and discussions have been particularly good and timely. The wonder to me is that you have been able to hold a convention at all with the electric show on one side and a championship base ball game on the other. The fact that you have been able to carry on your convention under these trying circumstances would indicate that there is a spirit of loyalty in this New England section which speaks well for it. You must be in love with your work or you could not have had the wonderful convention you have had.

Perhaps I should say that last week in New York City the Executive Committee of the National Electric Light Association decided to hold their next annual convention at Chicago, Ill. The date of the convention has not yet been decided on, and our friends in Chicago are now consulting the weather prophets in that city to discover upon what dates we would be most likely to have fair weather. The convention will certainly be sometime either in the last two weeks of May or the first two weeks of June. I want, on behalf of the National Association, to extend to all of you a hearty invitation to come to that national convention at Chicago. We believe the convention will be a good one. We are going to make a strenuous endeavor to make it a convention you will be glad to come to and which you will get a lot of good from. I believe we will be able to produce at that convention some of the most remarkable reports that have ever been produced by the National Association in the past. I don't mean to say that the work of the National Association in the past has not been all that it should have been, but I do mean to say that the personnel of the committee this year and the work that has been started early looking toward getting up a fine program, give reason for the belief that the Chicago convention will be more fruitful in results than any previous convention in our history.

I believe that those of you who can arrange to go should by all means go to Chicago. I think the Executive Committee acted wisely in deciding thus early on the next meeting place, because it gives everybody ample opportunity to make arrangements to get away and attend the convention. I know electric lighting people are very busy and sometimes can't get to these conventions, but I think everybody can stretch a point to come to this one. Those who have to stay at home and take care of the business will receive some of the benefits, from the fact that the papers will be printed and the discussions will be in their hands at an early date after the convention. And I believe that the material we will produce at that convention will enthuse those who attend so that when they return to their various localities they will impart some of that enthusiasm to those who have been compelled to remain at home.

Ladies and gentlemen, I want to thank you again for the very pleasant time we have had at the convention, and I hope that at your next convention we may all meet again. I thank you very much.

THE PRESIDENT. Ladies and gentlemen, we are further honored tonight by the presence of our most electrical friend, the Secretary of the National Association. Our convention would not be complete without a word from Mr. Martin.

MR. MARTIN. Mr. President: On my assumption of office as Secretary of the National Association, I looked to New England for hope and encouragement, and under your distinguished predecessor, Mr. Smith, the glad hand of support and encouragement was extended to me. We then had 3,000 members. Today we touch the verge of 13,000, and we have to thank the New England Section for the help it has given us, with your predecessors, Mr. Davidson, Mr. Campbell, Mr. Sands and now yourself.

I think it is very interesting, and should be interesting to the New England Section, to know how much the New England talent is still in demand in the West. Mr. Tait, it seems to me, was peculiarly modest in that respect. In New York City we have an obsession of western talent driven in and blown in upon us, so that we New Yorkers can hardly hold our own. But here in New England you seem to suffer still from the want of emigrating talent which has brought you the abandoned farm, and the cry in the West is for the talent and genius of New England. My friend here, Mr. Tait, on my left, has had his electric light training from your own New England, is today carrying on one of the largest and most successful systems in the middle and central West.

We are very glad, indeed, to be here—of course we are—on this soil and in this region which is sacred and consecrated to the spirit of electricity. As I came here to Boston the other day I thought once more I would tread the ground where Franklin was born, where Bell had invented his telephone, where Edison had first developed his wonderful genius, where Elihu Thomson had done his brilliant work—intellectual and classic Boston. I naturally assumed that would be the keynote of the occasion. But it is a good omen for the future of New England, which some people are inclined to think is drying up, to find that the whole atmosphere was keyed to another note. In New York City our interest in baseball is purely academic. I find that in Boston it is wholly physical. As I came from the meeting on Wednesday afternoon, I could not but be impressed with the attitude which Boston took toward our great national sport, because there rolled up a vociferous and triumphant wave of victory going home rejoicing in the world's championship. And it wasn't so much to rejoice in after all—only 3 to 2, you know. But still it gave one a new idea of Boston.

My friend on the left, our distinguished President, has referred to the influence of the women on our art, and I believe it is the first time that public acknowledgment has been made in that direction. But since I have been in the city this week, happening to go over the figures of electrical development, my attention was called to the fact that not only was Boston the home and birth place of the telephone, but that here it had enjoyed its largest development; and the reason given to me for the number of conversations and talks going on over the lines was the number of women in the community. (Laughter.)

There is one other aspect in which our electrical industry, I think, owes a great deal to this region, and it perhaps has not been referred to before, and that is with regard to the development of the copper industry of the United States. It may be said without fear of contradiction that if it had not been for the enterprise and courage and spirit of New England we would not have enjoyed that wonderful development of our copper industry to which so greatly we owe the ability to deliver our energy cheaply to the consumer.

New England has always cut a large figure in electrical development. Our New England Section has always played a large part in the history and the affairs of the industry and of the National Electric Light Association. When President Tait referred to the fact—and it is surely one of which we may be proud—that the New York Edison Company in the space of thirty years had served the community with an interruption of but six minutes, which occurred in the first year of its history, the thought occurred to me that there was something which should inspire us with zeal to do greater and greater things in the electrical business. For whatever else we may do in the direction of economy and efficiency, the one thing the public expects of us is continuity of service.

If I may be permitted, I should like to refer in this connection to a fact which I think should be mentioned here tonight. As editor of the Electrical World, I came over here twenty-six years ago to visit a fair at Mechanics Hall. I mentioned this last night at the meeting of our Company Section, and hope I may be excused if I do so again. With the aid of the manager of the Boston station, we built a large electrical sign which represented a hemisphere—North and South America. It was a fairly large sign, the largest Boston had ever known, and we found if we ran it on the circuit we would cripple the Boston Edison system, which had a capacity of 750 lights, 250 of which were in the sign!

At that juncture a real man appeared upon the scene, and he is just celebrating twenty-five years of continuous, brilliant, progressive service, and I am very glad to have this opportunity tonight to pay my testimony of esteem and respect to that past President of the National Electric Light

Association and great leader, Charles L. Edgar. I am willing here tonight to confess to you that when he came here I went to the manager of the lighting department of the old parent Edison Electric Light Company and expressed my doubts as to whether Mr. Edgar was not taking too big a job for his ability. (Loud applause and laughter.)

He has made good. And that is the kind of men we need in our industry. That is the kind of men that the National Electric Light Association is trying to breed. Such are the men who rise to excellence and prominence in the ranks of the industry.

We have 100,000 men in the central station field today—think of it!—we enroll 8,000 young men annually. That is one of the reasons why the National Electric Light Association, altogether aside from its productive work, or from its work of assisting companies in the operation of their plants, is throwing so much of its weight on the educational side. That is why it wants New England to help this great, splendid center of education, this great home of education, this center where Harvard and Yale have their fountains of learning—that is why we look to you to help us.

And what are you doing? Today we have forty company section, twenty-six of them in full operation, with some 8,000 or 9,000 members. What is New England doing? We have one company section in all New England! I don't know much about New England outside of Boston, but I have been supplied today by one of your members with a list of cities where we ought to have company sections. While my friend thought it might scandalize you, with his permission I will read this list.

You have today about 950 members. When you started in you had something like one-eighth of our membership. Today you are down to one-twelfth, and unless you get a hustle on you will soon be down to one-fifteenth. Here are the cities where we think you ought to have company sections. They are not arranged by states, but I take them in the order in which I received them:

Stamford, Bridgeport, New Haven, New London, Hartford, Woonsocket, Waterbury, Providence, Springfield, Pittsfield, Rutland, Brattleboro, Portland, Bangor, Bennington, Salem, Lynn, Newburyport and Concord.

I believe as a chaser we are to have my friend Chase of Concord and must finish. But I really would like to ask you whether there should not be something doing in all these communities—why we shouldn't have in all these bustling, progressive, successful New England communities more members than we have? Today the number is practically pitiful, outside of Boston. I am not asking for myself or for Mr. Tait, but my dear friend, Miss Bursiel, who is out for a record, and I want you all to get busy and see that a company section is created, in each of the towns and cities I have named, so that next year when we go to Chicago and want to hold up, as we have done, the banner of New England, we will be able to say that your membership is not less than 1,000, but that you are at least 1,500 or 2,000 strong, as you should be. This is an *argumentum ad hominem*, and I am putting it straight and from the shoulder.

The National Association, as Mr. Tait has said, is an institution of which we may be proud. It is today the largest aggregation of engineering talent in the world. There is no engineering body that can compare with it in numbers, in influence, in possibilities and in opportunities for usefulness. And this fact was particularly borne in upon me just before I left New York in order to enjoy once more the opportunity of meeting you in your generous and hospitable conventions.

We have just issued to the world, as part of our educational and humanitarian work, our resuscitative chart and booklet, embodying the latest rules and regulations and advice as to the resuscitation of those who are suffering from shock. Now, it has never so far as I know happened before in the history of any industrial body, but the United States government has availed itself of our work in this connection, and is making the work we have done and you have done part of its instructions to a department. At the present time the United States Navy has taken our resuscitation chart and booklet and is printing it for itself, so that it will appear in every ship and will be carried to the four corners of the Globe, representing the high ideals, lofty aims and spirit in advancing the welfare of mankind that animate the National Electric Light Association. (Applause.)

THE PRESIDENT. Our program this evening is short: We will now return to New England. I am going to ask one of our members to preach a new sermon from an old text—"Readiness to Serve." Mr. Chase of Concord.

READINESS TO SERVE.

BY LEVIN J. CHASE.

Mgr. Concord Electric Co., Concord, N. H.

It has been given to me to speak the final word and pronounce the blessing of peace. In obedience to a law of modern progress, we were called together to advance the development of one of the greatest agents of civilization and now, having accomplished our purpose, the hour of final adjournment is close at hand.

Many of the phases of our industry have been discussed with profit, we have taken account of its progress and made more or less definite plans for its inevitable expansion. Bearing these things in mind, it is not for me to worry you with technical abstractions or the deeper problems of our calling. An after-dinner address should be heavily charged with electricity, but the auditors, being in the throes of digestion, will be more interested in its manifestations than in the details of its manufacture.

It is my purpose, therefore, to lead you gently but firmly away from the harsh realities of business and ask you to consider, as briefly as may be, the ever-growing graces, humanities, and moralities of modern commerce. In as much as all that we do, and the splendid things that we plan to do, rest upon the more or less insecure foundation of human nature, it is important to consider certain phases of human nature in their relation to public service. The defects of human nature are apparent in all human institutions, and one of the greatest problems that confronts us today is to devise ways and means to minimize these defects, and as far as possible render them ineffective.

It may be that some of my audience will regard the title of this paper as presumptuous, coming from one who has been engaged in public service less than five years, and to all such let me relate the story of the New Hampshire bachelor who was giving a perplexed father his ideas on the raising of children. Finally the father, with some show of irritability, replied, "What do you know about raising children? You have none of your own!" "True," replied the unabashed bachelor, "and I don't keep chickens, but I can tell a good egg from a bad one as well as any man in the state."

And so it may fall out that the random ideas of an optimist who has entire faith in humanity will have a soothing effect upon those who are prone to believe that human nature is unchangeably selfish and cruel. Cynics, the greatest of all obstacles in the path of progress, have for centuries been busily engaged in slandering human nature. The cynic worships the shadow and discards the substance, and is a competent judge of nothing except himself. A man's intellectual power should be gauged by his ability to believe and not to scoff, for the scoffer is the Laughing Hyena of humanity. Sometimes we encounter a gentle cynic who does good after a fashion, but they are very rare and, generally speaking, they resemble a cow that I knew in my boyhood, which used to give an eight quart pail of milk every night, then kick it over.

As a matter of fact, human nature is no more unchangeable than human habits. If we draw a mental picture of primeval humanity, of which we have unquestionable records, with the humanity of today, the conclusion is irresistible that human nature has steadily grown in all the graces and moralities of an ideal civilization. In its march toward ultimate perfection human nature changes and goes forward in harmony with the ages, and the man who goes through life with the fixed belief that human nature is necessarily selfish, and that self preservation is its first law, is like a dog biting at the heels of Progress.

In these days of social and industrial unrest, when it is apparent that we are passing from one epoch of our national life to another, the men with an abiding faith in humanity are the ones that in the end will lead us out of the wilderness. Today, more than ever before, we need men who believe in mankind and in themselves. We need men of broad humanity with a wide range of healthy sympathies to stem the muddy currents of socialism, men that will teach the doctrine of faith and check the insidious poison of doubt and apprehension.

We need men in politics who will strive for Truth rather than Victory, and in the great world of commerce we need the very best we breed to grapple with the problems of the hour.

And nowhere is there a greater need for big men, men of high purpose, unflinching courage and unblemished integrity than in the ranks of corporations engaged in public service. These corporations are today the principle targets for the shafts of public displeasure, and until the public is convinced that they are honestly and wisely administered they will be impeded by prejudice and hampered by stupid legislation. Great progress has been made during the past ten years, and I am proud to say that the leaders and principal advocates of a more enlightened public service have been the companies engaged in the manufacture of electricity. Although ours is the latest form of public utility, we have, largely through the influence of this organization, done more to check public clamor than all the other corporations in the United States.

And while we have every reason to be proud of that record we have a right to be even more proud of our product, which is at present the leading agent of commercial progress and is rapidly becoming the main-spring of civilization.

We are proud of our product and proud of the fact that the corporations engaged in the manufacture and sale of this marvelous energy have thus far led all other corporations in the matter of public policy, and it has been the constant effort of our association to keep its members in the vanguard of Progress. But the world moves and conditions change so rapidly that this seems to be an opportune time to ascertain if possible the vital principle of a thoroughly modern and enlightened public service, or in other words, a policy that will satisfy not only an exacting public but the stockholders, who very naturally expect a fair return on their investment.

One of the stereotyped expressions of the lighting business is "Readiness to Serve," and that phrase taken in its broadest sense is to my mind the vital principle of public service. In order to broaden its sense, I will amend it slightly and let it stand "Readiness to Serve Faithfully and Graciously." Some service has all the essential characters of assault and battery. There is no moral quality in service, either personal or public, unless it is performed graciously and with a wholesome faith in humanity. Moreover, it is my settled conviction that no man is qualified to direct the public policy of a corporation unless he believes in human nature and in the general worth and integrity of the people he serves.

It may be said of me that I am a dreamer and a chaser of rainbows, but I say to you without fear of refutation that the actualities of today were dreams in my boyhood.

The man who believes in human nature seldom appeals to it in vain. This man is able to look into the future and adjust himself unconsciously to the great scheme and system of human society. He believes in humanity, and what he gives in faith he gets for himself. He is strong in his convictions and stands by them without cringing and without apology. He does not grope and stumble in a darkness of his own making but goes cheerfully out among men, scattering seeds of goodwill wherever he goes. He possesses a big, broad, human courtesy, a courtesy with blood in it, which recognizes the existence of other human beings besides himself, and points of view other than his own.

This man is equipped by nature to direct the destinies of a Public Utility. He is better than any law or regulation because he knows the real inwardness of service and realizes that "Readiness to Serve" involves far more than the pulling of a lever or the turning of a switch. He knows that a service to be good implies not only physical regularity, but a spirit that must penetrate to the very heart and marrow of his organization. Many people think that good service depends on the engineers and the line gang, but important as they are, they only do their part. The other part is to establish a bond of faith between the buyer and the seller, and that must be done by men who are able to operate the mysterious switch-board of human nature.

These men, if they are to win public confidence and establish the proper and natural relationship between the buyer and the seller, must abandon the erroneous idea that the people as a whole are unreasonable. A great many corporations in this country have acted on that belief, and it is they, and not the people, that are responsible for the misunderstanding which exists today. In one way and another corporations displayed their lack of faith in humanity, and what they gave they got. It was a false start and the guilty ones must come back and start over, and those who have made a good start must continue on the straight course or they will be disqualified by public opinion. All that corporation managers need do to win public favor is to do business on the highest possible plane, which means to do as they would be done by, and to have faith in and understand the people, holding themselves and their organizations in constant "Readiness to Serve."

The more closely we study this question the clearer becomes the conviction that the complete success of a Public Service Corporation depends almost wholly upon the man who directs its public policy. An organization unconsciously reflects the attitude of its directing mind, and he is usually the master of its destinies. Such being the case, I am going to take it upon myself to offer a few homespun suggestions which are based upon a careful study of old-school blunders and the commercial fallacies of the past. The advice that St. Peter gave to his followers centuries ago is as sound today as it was the day he gave it, and is singularly applicable to those engaged in public service. He said,—

"And besides this, giving all diligence, add to your faith, virtue; and to virtue, knowledge; and to knowledge, temperance; and to temperance, patience; and to patience, godliness; and to godliness, brotherly kindness; and to brotherly kindness, charity."

The temperance referred to means temperance in speech as well as anything else. An unruly and bitter tongue is responsible for much trouble. The skulls of some men seem to be full of poison, and such people are of no more use to humanity than a stinging lizard.

Charity covers not only the giving of alms but charity in our judgments and opinions of others. One of the meanest of all human traits is imputing unworthy and selfish motives as the main-spring of worthy deeds.

Men engaged in public service come in daily contact with all kinds of people, and they should study the science of tongue-control, be broad and charitable in their judgments of others and cultivate an infinite patience, for on patience and knowledge hang all the law and the "profits."

The man who is responsible for the policy of a public service corporation should bear in mind that present-day progress is so rapid that the one who says that a thing is impossible is thrust aside by the man who does it. There is no virtue in stubborn conservatism or in a slavish devotion to the so-called wisdom of the past. A man's head can be equipped with every modern convenience, or it can be made a storehouse for all kinds of useless junk. Many worthy people cling desperately to worn-out methods and threadbare traditions. They dread change by instinct, and it is a part of their religion to be loyal to the past. They will speak well of the bridge that carried them over, even if that bridge is rotten and plainly out of plumb.

And strange as it may seem, it is more difficult to convince this very intelligent class that an ancient truth is oftentimes a modern lie, than it is to convert a Socialist, tame a militant suffragette, or wean an anarchist from his bomb.

Some people, like the Apostle Paul, must be converted by being struck by lightning.

A man who has large dealings with the public should cultivate an even disposition. If he has a hasty temper it should be equipped with a circuit-breaker, for anger generally does more harm than the offense that provokes it. One of the ancients said, "Learn to greet people with a smile." The old philosopher did not mean a forced smile, but one that paves the way to a pleasant greeting. A smile is oftentimes as potent as a gentle answer which turneth away wrath and soothes a ruffled customer.

The world reflects to every man his attitude toward the world. Growl at it and the growl comes back, smile and you seldom smile alone.

If you begin the day with a smile you make a good start. It was said of Lord Holland—"He always comes to breakfast like a man upon whom some sudden good fortune has fallen."

The man who sits down to breakfast with a smile is a more agreeable companion than the one who approaches the morning meal with a face as cheerless as a stagnant pool. And the woman who is obliged by solemn vows to sit opposite that face is entitled to sympathy, alimony, and the custody of the children.

The man who controls the policy of a Public Utility should be careful to surround himself with assistants that are in entire harmony with his aims, and his attitude toward them should be humane and considerate. This is a matter of vital importance because, as I have repeatedly pointed out, the treatment that an employee receives from his employer is promptly passed on to the public. No man who is smarting from a sense of injustice is a qualified public servant. In our business it is well known that many consumers form their opinion of the company from the personality of the meter reader, consequently, the selection of a meter reader is as important as the selection of a cashier.

The man called upon to handle men should bear in mind that injustice lingers in the mind like the bite of a serpent, that the productive capacity of men is decreased when they are kept in a state of uncertainty, that the vital force of an organization can be seriously weakened by doubt, gossip and suspicion, that it is possible to kill the ambition of a good man with harsh criticism, that a careless man can be made careful by appealing to his pride—not his fear—that mutual confidence between employer and employe is the first principle of scientific management, and that the proper relation between employer and man is the human relation which involves kindness, justice, sympathy, and a tacit recognition of brotherhood. In short, it is a relation of mutual service, and would result, if faithfully followed, in a cheerful and unremitting "Readiness to Serve."

The labor problem will not be solved by legislation, nor by blood, but by high-minded, far-seeing men and women who desire to advance the welfare of mankind.

The employé should not only be well treated, but well taught. See to it that he has a good knowledge of his duties and wisdom enough to perform them properly. Knowledge comes but wisdom lingers, and many people never know the difference. Teach him that one of the chief ornaments of a human being is an obliging disposition. Teach him that a glad-hand is a good thing but a helping-hand is better. Impress upon him the fact that the man who wins is generally an average man with grit and a capacity for hard work.

There is no secret for success but the nearest thing to it is Intelligent Energy. In all callings there are men who could go higher if they possessed more energy and ambition. Of course many energetic and ambitious men fail to secure recognition, but in a majority of cases, when promotions are to be made, the live men have the advantage.

The go-ahead, studious employes, those who have patiently acquired an accurate knowledge of the business, are not kept in subordinate positions by employers who have a keen eye to their own interests. Men with progressive ideas, who devise ways and means to lop off unnecessary expenses and prevent waste are reasonably sure to receive better pay than those who work like puppets. Teach your men to think. One foreman can put a man to work but twenty can't make him think.

In all occupations success is achieved by hard and intelligent work. In these days the man with a "pull" cannot compete with the man who pulls. The shirkers stand still and the workers go forward. Ambitious, cheerful and efficient men are always in demand, and generally speaking their names are found at the top of the pay rolls.

When you see a man becoming inflated with his own knowledge, teach him the blessings of humility. There is some good in most men. The doctrine of total depravity has been consigned to the ever-growing scrap-heap of the ages. There are very few unmixed evils but the nearest approach to it is the "Man Who Knows It All." He bears the same relation to an organization that the weasel bears to a dovecote. This type of man is conceited in proportion to his ignorance. He sets himself up as a judge of his own importance. He has no respect for opinions that differ from his own, and only the fevered brain of a drunken optimist could find the good there is in him. He is a menace to the peace and efficiency of any organization because he is so strangely constituted that when he is right he wavers and when he is wrong he is as steadfast as the everlasting hills.

It is our duty to give these matters profound consideration, if we are to raise the standard of public service and share the responsibilities of progress in our day and generation. And unless we take up the task with the quiet enthusiasm born of faith in humanity, we shall fail. Business is no longer the science of larceny but a system of exchange for mutual benefit. A business transaction was originally a matter of barter between two cheats. In the Scriptures we find the proverb, " 'It is naught, it is naught,' saith the buyer, but when he is gone his way, then he boasteth," which in plain English means that even in those old days the buyer was in the habit of running down the article that he wanted and when he had secured it, went on his way, boasting that he had outwitted the seller. Even today we sometimes hear a man say, "Business is business," when he wants to excuse some selfishness or sordid brutality. But by slow degrees and painful effort we have reached higher ground. The old principle of law, "Let the buyer beware," has been repealed by general consent, and today there are men in untold thousands who would rather fail than cheat.

But the world is so much with us even now that rather than make an after-dinner speech I have preferred to preach a sermon, taking for my text a familiar phrase, which is too often used in a narrow and restricted sense. It requires some courage to stand up before an assemblage of business men and preach the doctrine of faith and love. But I have no apology to make for my faith in human nature or my willingness to proclaim it to all men. This doctrine should not be deemed a heresy, even in a convention of business men, for love is the quick and moving spirit of the universe. It is love that sends us forth each morning with strength to meet the duties of the day and it is love that speeds us back to the home. It is love that builds and preserves the spiritual structure of the home and it is the union of homes that creates the strength and majesty of the nation. The influence of kind words and gentle deeds is the life-blood of human progress, and the memory of a tender and unselfish love sustains many a man in his darkest hours. It is a memory that lingers until the final breath.

Those who think that the world is growing worse are led astray by shadows. The press of our time ignores the normal life of mankind and records the abnormal, the unusual and the gruesome. The good that men do is not news.

But the good that men do lives after them and is not, as we are told by one who knew better, buried with their bones. Every kind word and every good deed is immortal and the world is full of them.

The busy press-agents of evil mislead the unthinking and the shallow, but those who sound the depths of human nature will find comfort in the present and an abiding faith in the future.

The good that men do is not proclaimed from the housetops, and the press has neither time nor space to print the goodness of mankind. We hear the tumults and the shoutings and the mad music of Moloch, but the harmony that dwells in a kind work is as elusive as the music of the stars.

And the doers of good that have passed beyond this world are as immortal as their deeds, even though their names are forgotten. Though dead they are still alive—speaking through works of grace and love that will live after them as long as time endures.

The convention adjourned *sine die.*

Fifth Annual Convention

of the

New England Section

National Electric Light
Association

Burlington, Vt.

September 17, 18 and 19, 1913

OFFICERS FOR 1913

A. F. Townsend, President, Woonsocket, R. I.
C. C. Wells, Vice-President, Middlebury, Vt.
R. W. Rollins, Treasurer, Worcester, Mass.
Miss O. A. Bursiel, Secretary, Boston, Mass.

EXECUTIVE COMMITTEE

H. B. Ivers, Portland, Maine.
L. J. Chase, Concord, N. H.
A. B. Marsden, Manchester, Vt.
L. D. Gibbs, Boston, Mass.
E. A. Barrows, Providence, R. I.
B. H. Gardner, Waterbury, Conn.
J. S. Whitaker, (Ex-officio) Portsmouth, N. H.

MEMBERSHIP COMMITTEE

Maine.

H. B. Ivers, Cumberland County Lt. & Pr. Co., Portland, Me.
H. E. Plummer, Lisbon Falls.
Thomas Hawken, Rockland, Thomaston & Camden St. Ry. Co., Rockland.

New Hampshire.

L. J. Chase, Concord Electric Co., Concord, Chairman.
J. S. Whitaker, Rockingham County Lt. & Pr. Co., Portsmouth.
S. P. Hunt, Manchester Traction, Lt. & Pr. Co., Manchester.
C. W. Rogers, Exeter & Hampton Elec. Co., Exeter.

Vermont.

A. B. Marsden, Manchester Lt. & Pr. Co., Manchester, Chairman.
Walter H. Vorce, Vermont Pr. & Mfg. Co., St. Alvans.
H. D. Larrabee, Consolidated Ltg. Co., Montpelier.
Wilfred Smith, Woodstock Electric Co., Woodstock.

Massachusetts.

H. T. Sands, Malden Electric Co., Boston, Chairman.
L. D. Gibbs, Edison Elec. Ill. Co., of Boston.
E. S. Hamblen, Weymouth Lt. & Pr. Co., E. Weymouth.
C. B. Burleigh, General Elec. Co., Boston.
C. D. Williams, Simplex Elec. Htg. Co., Cambridge.
Percy J. Wilson, Lowell Elec. Lt. Corp., Lowell.
S. Fred Smith, Salem Elec. Ltg. Co., Salem.
H. M. Parsons, Central Mass. Elec. Co., Palmer.

Rhode Island.

E. A. Barrows, Narragansett Elec. Ltg. Co., Providence, Chairman.
S. B. Tuell, Blackstone Valley Gas & Elec. Co., Pawtucket.
E. P. Gosling, Bay State St. Ry. Co., Newport.

Connecticut.

B. H. Gardner, United Elec. Lt. & Wtr. Co., Waterbury, Chairman.
H. E. Page, Electric Supply & Equip. Co., Hartford.
Samuel Ferguson, Hartford Elec. Lt. Co., Hartford.
Wm. M. Lewis, Rockville Gas & Elec. Co., Rockville.

RATE COMMITTEE

W. S. Wyman, Central Maine Power Co., Augusta.
W. G. Meloon, Twin State Gas & Elec. Co., Dover.
H. D. Larrabee, Consolidated Ltg. Co., Montpelier.
R. S. Hale, Chairman, Edison Elec. Ill. Co. of Boston.
Jesse E. Gray, Narragansett Elec. Ltg. Co., Providence.
Walter P. Schwabe, Northern Conn. Lt. & Pr. Co., Thompsonville.

Fifth Annual Convention of the New England Section, National Electric Light Association,

Burlington, Vt., September 17, 18 and 19, 1913.

The Fifth Annual Convention of the New England Section, National Electric Light Association, was held at Hotel Vermont and in Armory Hall, Burlington, Vt., Wednesday, Thursday and Friday, September 17, 18 and 19, 1913, under the Presidency of Mr. A. F. Townsend of Woonsocket, R. I.

In opening the first day's proceedings the President said:

I wish to extend to members and guests the cordial welcome of the New England Section at this, our fifth annual convention.

The first order of business was the reading of communications from presidents of various electrical associations who could not be present.

Mr. R. W. Rollins of Worcester, Mass., Treasurer and Acting Secretary, read letters of regret at inability to accept invitations to be present from Wm. H. Meadowcroft, Assistant to Mr. Edison; J. B. McCall, President, National Electric Light Association; J. E. Davidson of Portland, Ore., formerly of Burlington; E. C. Deal, President of the South-Eastern Section; A. S. Dodd, President of the Iowa Electrical Association; Van Dusen Rickert, President of the Pennsylvania Electrical Association, and a telegram from D. R. Street, President of the Canadian Electrical Association.

The President. The next order of business is the reading of the report of the Executive Committee:

REPORT OF THE EXECUTIVE COMMITTEE,

New England Section, N. E. L. A.

The Executive Committee have held five meetings since the last Annual Meeting in October with an average attendance of six members.

The committee have given valuable time and thought to the affairs of the Association. It has been finally decided to hold but one convention a year, that to be held in the fall prior to November 1st. The Executive Committee have also appointed a Special Committee of sixteen members, eleven members to be representatives of manufacturers, jobbers and contractors and six to be representatives of central stations to arrange for Get-Together meetings throughout the year.

The President. The report of the Treasurer, Mr. R. W. Rollins:

REPORT OF THE TREASURER.

R. W. Rollins.

Boston, Mass., September 18, 1913.

To the Members of the New England Section of the National Electric Light Association:

Gentlemen:

I beg to submit the following report for the year ended September 1, 1913:

RECEIPTS.

October 1, 1912, balance of cash on hand . .	$36.73
October 7, 1912, rec'd from N. E. L. A. refunds	362.65
Dec. 10, 1912, rec'd from N. E. L. A. refunds .	500.00
Jan. 21, 1913, rec'd from N. E. L. A. refunds .	500.00
March 25, 1913, rec'd from N. E. L. A. refunds	500.00
May 19, 1913, rec'd from N. E. L. A. refunds .	500.00
August 14, 1913, rec'd from N. E. L. A. refunds	1,000.00
Total	$3,399.38

EXPENDITURES.

As per receipted vouchers	$2,475.26
Balance of cash on hand September 1, 1913 . .	924.12

THE PRESIDENT. The report of our Secretary:

REPORT OF THE SECRETARY.

MISS O. A. BURSIEL.

Since our big convention held last October during the 1912 Boston Electric Show in Mechanics Building, Boston, the largest amount of work on special campaigns, as well as routine affairs, has been accomplished at our New England Section Headquarters.

We feel that not enough of the members of our New England Section appreciate that we have permanent headquarters in Room 1123 of the Lawrence Building, which is at the corner of Tremont and West streets. The office is open every business day from nine until five. All of our members should realize that they are welcome there, and the officers are sure that if they will take advantage of their opportunities to drop in there and see what is being done, peruse the publications always on hand, including not only books, booklets, bulletins and circulars sent out from the National Headquarters, but all of the current electrical publications, they will see opportunities for getting much more than many of them do out of their membership in our organization. Those members who may be said to simply "stick along" from year to year without appreciating what their membership is worth, and keeping in simply because their associates do, are not getting what they should. No member, especially of the classes B and E, can get so much literature, so much information and so much real expert help from any investment of five dollars in any organization as is possible in our association.

During the greater part of the year 1912 weekly luncheon club meetings were held at the American House, the securing of speakers, printing and mailing of notices each week, the handling of tickets, etc., being carried on by the Secretary.

The first of the new year a campaign was executed by sending an effective red-ink return postal card to our Class B and E members, some 650, asking them to send in the names of men who ought to belong to the National Electric Light Association. Upon receipt of a goodly number of prospects' names different types of mail matter were sent them every week, which resulted in a good many new members being added to the rolls.

Early in March the Constitution and By-Laws together with the Membership List was printed and distributed to the entire membership.

In May it was my pleasurable duty to be a member of the headquarters staff of our National office at the National convention in Chicago and assist in the voluminous preparations for that big convention. Our party of seven were busy day and night for a week in advance of the convention handling the correspondence, writing reports, sending out special invitations, assembling the papers in complete sets, placing the names in individual badges, filing programs and badges, etc., etc., so that on the opening day of convention members who had registered in advance might find everything awaiting their arrival.

During the past year over 15,000 pieces of mail have been sent out from the Secretary's office, beside many express and parcel post packages of literature sold from time to time. The New England office keeps on hand copies of all of the publications issued and sold by the National Association. Among these are the Electrical Meterman's Handbooks, the Standard Classification of Accounting, the Question Box Review, Rules for Resuscitation from Electric Shock, etc.

Ninety-six new members have been added in the various classes since January 1 last. The membership now stands as follows:—117 Class A, 512 Class B, 13 Class C, 52 Class D and 175 Class E—a total of 869.

All the preparations of this convention have been carried on from this office and we trust its success will compensate the earnest efforts of those who have worked hard to make it the finest convention ever.

THE PRESIDENT. We have one other report to be read and I will give my address.

Mr. R. W. Rollins of Worcester presiding.

PRESIDENT'S ADDRESS.

MR. A. F. TOWNSEND, WOONSOCKET, R. I.

Delivered September 18, 1913.

It is a privilege, and one which I fully appreciate, to extend to you members of the New England Section, National Electric Light Association, and our guests, the greetings of the New England Section, and to bid you welcome to our Fifth Annual Convention.

Last Spring the Executive Committee, after careful consideration, chose this city as the place to hold the Fifth Annual Convention. It felt that Burlington and the Green Mountain State held unusual attractions at this time of the year, and that many of our members liked to get away from the densely populated sections.

We have at this convention representatives indentified with every branch of the electrical industry, who have come here for the purpose of getting acquainted with each other, and to discuss their problems for mutual benefit, and it is hoped that every one will take the fullest advantage of this opportunity.

The subjects of the papers we have had prepared, were carefully selected, and are topics of universal interest. The authors of these papers have prepared them at the expense of a great deal of time and thought, and we trust that they will interest you and that you will enter freely into their discussion.

The report of the Treasurer shows an improvement in the financial standing of the section over that of last year, even in view of the fact that our revenue from the National Association has been reduced, due to a decrease of 50% of our proportion of the yearly dues of Class "B" and "E" members, on all memberships in excess of five hundred (500), where heretofore our proportion from all Class "B" and "E" memberships was 50% of the yearly dues. The improvement in the financial standing of the section this year is due principally to the elimination of the Spring convention.

The report of the Secretary, which has just been read, shows clearly the progress this section has made during the last year. This does not convey to you the untiring efforts, and the excellent work that has been accomplished by her, and on whom the larger proportion of the work has naturally been placed. The success and remarkable progress that our Section has shown since its inception, is in a large measure due to her optimism and enthusiasm, and her full appreciation of the value of this Association to its members.

In the interests of the New England Section, I have attended meetings of the Executive Committee of the National Body at the Association's office in New York, and also the executive meeting held in Chicago on June 2nd. I was cordially received by officers and members of the Executive Committee of the national body. A great many matters were discussed at these meetings which have been of material value to our section.

At this point it might be well to mention that the next convention of the National Electric Light Association will be held in Philadelphia, the home city of President J. B. McCall, and the convention in 1915 will be held during the week of June 14th in San Francisco, California, thus giving the members an opportunity to attend our second convention on the Pacific coast, and also to visit the Panama exposition.

For some time there has been a feeling that two conventions a year were over-taxing the finances of the section, and the time of its members. This question has been touched upon in the addresses of two of our past presidents, but at that time it did not seem advisable to make any change. Your committee this year decided that in view of the extra expense thrown upon the section, that it was advisable to hold in the future only one convention a year. This practice should in time, with proper growth in membership, allow the section to accumulate a surplus fund.

From inquiries that come into our office from time to time, I am of the opinion that many of our members, and lots of others connected with our industry, do not realize that we are an integral part of the National Electric Light Association, an association that now has a membership of approximately 12,500 members, and is the largest association representing a particular industry in existence. The membership of this association represents approximately 90% of the capital invested in central station properties in the United States. A membership in the New England Section means a membership in the National body.

The facilities of the office of the National body, as well as our New England Section office, are at the members' command. Both of these offices are a clearing house for information pertaining to our business. When one stops to consider the value of the bound volumes of the convention proceedings of the National body, as well as the New England Section; the monthly bulletins, the many valuable reports and various other publications gotten out for the benefit of members from time to time, it is a wonder how anyone can feel that they can afford to stay outside of this association.

While we are now the largest geographic section, and are the only one that maintains a permanent office and secretary, our future success depends upon increasing its membership, as it is necessary to infuse new blood into our organization to take the place of old members who are dropping out from time to time, and to show a steady growth.

I want to make an appeal to managers and superintendents of Class "A" member companies for new members, the future growth of the association lies practically in their hands, as it is impossible for your officers and secretary to get in personal touch with the majority of our prospects, and I am thoroughly convinced that it is the personal equation that counts in securing new members. A manager or superintendent of a company, in my opinion, should seek the application of anyone in his organization who he believes can secure value received from a membership in this association, and if the advantages of the association are properly explained, they will be successful in securing many new members.

An active attempt has been made this year towards increasing our membership, and early in the year it was decided to revise our Class "A" membership prospect list, feeling that the list of prospects, as it stood at that time, did not show actual conditions. This list was revised, and the returns showed a considerable decrease in the number of actual Class "A" prospects in New England, due largely to the consolidation of properties.

Upon the revision of the list, an active effort was made to secure this class of membership. The following shows the list of possible Class "A" prospects:

Maine	20
New Hampshire	20
Vermont	14
Massachusetts	15
Connecticut	0
Rhode Island	0
Total	69

An effort has also been made to increase other classes of membership, particularly Class "B," which takes in employees of Class "A" member companies. In this connection our office sent out on January 31st, 1913, one hundred and fifteen (115) letters to member companies, asking for the following information:

1. "Total number of men employed in electric department."

2. "What percentage of those employed in your electric department should, in your opinion, become Class 'B' members?"

From this letter we received twenty-three (23) replies, or approximately 20%.

On April 17th, 1913, letters were sent out to ninety-two (92) Class "A" members, urging them to reply to our letter of January 31st. We received ten (10) replies, or approximately 10%.

The percentage of answers to our letters of inquiry were not what you would naturally expect. However, it gave us something definite to work upon, showing that in the opinion of the companies that did reply, that there were fifty (50) good Class "B" prospects in these companies, and an active effort was made to secure them as members. Some have already joined, and we are working on the balance. The membership growth of our section must in the future come principally from this class of membership, employees of Class "A" member companies.

An active effort has also been made to secure Class "D" and "E" members, and this should be continued.

Our membership at the present time shows a total of 868 members, including all classes, as compared with 860 a year ago. The section has enrolled ninety-five (95) new members this year. This, however, does not show an increase in membership of ninety-five (95), due to the fact that our membership records have been revised, and it was found that a considerable number of our members were in arrears a year or more, and it was decided to drop them from the rolls.

The section's membership, as it stands today, shows only revenue producing members. This house cleaning leaves the membership of the section on a good deal better basis, and we know on just what to base our plans.

On May 2nd our section held a very successful "get together" meeting in Boston. There was an attendance of about three hundred (300), and everyone had an enjoyable time. An extensive program was prepared, the most important of which was a paper read by our Past President, Mr. Howard T. Sands. Mr. Sands' paper was not only interesting but instructive, and was thoroughly enjoyed by all.

I have appointed, by the consent of the Executive Committee, a special committee of sixteen, which is composed of five representatives of central stations and eleven representatives of manufacturers, jobbers and contractors. There is felt a need of the most hearty co-operation between the various interests in our industry, and it seems that this can best be brought about by getting the various interests of our New England section together frequently at "get together" meetings and dinners, so as to afford ample opportunity for the making of acquaintances, discussion of business problems, and the formulating of plans for mutual betterment, and the New England Section affords ample facilities to carry out this form of work.

This committee has held one meeting, and recommended to the Executive Committee that a meeting be held once in two months, or possibly five meetings during the winter season; the meetings to consist of a business session, and a talk or paper on some subject of interest to the members of the section. This being followed by a dinner, and possibly a theatre party in the evening.

As president of the section, it was my privilege to spend the week of September 6th at a convention of presidents of electrical associations and societies in the United States, at Association Island, Henderson Harbor, New York.

The key-note of the convention was "Co-operation," and an extensive and interesting program was prepared, addresses being given by some of the leading men in our industry.

Mr. Frank Vanderlip, President of the City National Bank of New York, gave an address, touching on the problems of financing public utility companies, showing to what immense proportions our business is growing. He stated that the capital requirements of central stations during the last period of five years were $900,000,000, or an average of $180,000,000 each year. He forecasted that central stations, and allied industries, would require for the next period of five years, an average of $400,000,000 annually. One can hardly realize the magnitude of these figures until they stop to consider that this means the under-writing of approximately $8,000,000 of securities each week, to meet the demands of our rapidly growing industry.

Mr. Vanderlip also pointed out that if the fresh capital needs of our industry were to be secured at a low cost of financing, that managers of public utility companies must fully realize their responsibility, and so conduct their operations as to win and hold public regard, as one of the greatest fears of the investor is unfavorable public criticism, and this can only be overcome by proper management, and the full appreciation of the public's rights.

Throughout the year there has been a continued increase in welfare work on the part of public utility companies. There are many phases of the work taken up and handled in various ways by the different companies. It is believed that this work is of value, and it is hoped that more companies will take it up.

Municipal ownership crops up now and then, but this can best be handled by central station companies furnishing the best of service at reasonable prices, and so conducting their business relations with the public that the public will fully realize that they are getting a square deal.

I want to express my sincere appreciation and thanks to our officers, our Executive Committee, the Secretary, and the chairman and members of the various committees, for their help to me personally and for the work they have done in behalf of our Section.

The President. The next matter of business is a report of the Rate Committee.

REPORT OF RATE COMMITTEE.

At our meeting we laid out a plan of publishing the rates of five or six New England companies revised to show how the wording suggested by the National Committee would simplify the presentation of rates.

We found that the National Committee is planning to do substantially the same thing, and in fact to publish the rates of about ten or a dozen companies which will include the rates of the four New England companies that we discussed at our meeting. This publication will not give the name of the company, only the state; as for instance, a Massachusetts company, a New York company, etc., since the publication will change the wording of the rates as published by the company itself.

Under these circumstances the report we had planned would only be a duplication of the work of the national committee, and suggest, therefore, that we report that we held a meeting, had co-operated with the National Committee in its work, and that as we had found that our report would be merely a duplication of the National Committee we beg leave to be excused from making any separate report. Our New England convention will not come until some time after the national convention.

A letter from R. S. Hale, Chairman of the Rate Committee, New England section:

Miss O. A. Bursiel, Secretary New England Section N. E. L. A., 149 Tremont St., Boston, Mass.:

DEAR MISS BURSIEL:

In reference to the Rate Committee of the New England Section, we find that the work we laid out is substantially the same as that planned by the National Committee for companies all over the country instead of for just a few New England companies.

Under the circumstances, the Rate Committee will probably not make any report except to say that it has been co-operating with the National Committee.

As a member of the National Committee, I can say that the work of the New England committee has helped us considerably.

Very truly yours,

(Signed) R. S. HALE,
Chairman of Rate Committee,
N. E. Section, N. E. L. A.

THE PRESIDENT. Gentlemen, you have heard the reports of the Executive Committee, Treasurer, Secretary and Rate Committee. What is your pleasure in regard to these reports?

(On motion, the reports were accepted.)

THE PRESIDENT. I appoint as a Nominating Committee the following: Howard T. Sands, Mass.; E. R. Davenport, R. I.; H. D. Larrabee, Vt.; F. W. Prince, Conn.; John Wilson, N. H.

I appoint as an Auditing Committee H. A. Gidney, Mass.; and W. E. Clarkin, Mass.

Next on the program is a paper, "Problems of Central Station Managers in Cities of Less than Five Thousand Inhabitants," by A. B. Marsden, Manchester, Vt.

PROBLEMS OF CENTRAL STATION MANAGERS IN TOWNS OF LESS THAN FIVE THOUSAND INHABITANTS

OR

THE LITTLE FELLOW'S TROUBLES.

BY A. B. MARSDEN,
Manchester Light and Power Co., Manchester, Vt.

This paper may not conform strictly to its title, the idea of which was conceived at a conference for the discussion of ways and means of increasing the Association membership and, in diverging from the promised subject matter, it is the hope of the writer, who is, himself, one of the "little fellows" that some measure of good may result to the central stations mentioned in receiving more consideration, and to the Association by their affiliation and support.

To the dweller in the large city any community of less than 40,000 or 50,000 inhabitants is small, but we are to consider those much farther down the numerical scale. Of the 5927 central station plants in the United States, according to the McGraw Electrical Directory, April, 1913, issue, more than 4000 are in towns of 5000 inhabitants or less, and approximately 3200 in towns of 2500 or less. These figures do not take into account those suburban communities which are served by the large companies. Many of these small companies are members of the National Electric Light Association; some are being swallowed in the course of consolidation, but a large percentage hold aloof because of the feeling that the Association is all right for the large companies but of little practical use to the small ones. We gather year after year and listen to papers on a variety of subjects, ably prepared and intelligently presented and discussed by men of undenied ability, but few cover those things in which they are particularly interested—the practical conduct of the small business. Voluminous systems of accounting and elaborate new business plans are interesting but possess little attraction for the man who often combines the official duties, though not the titles, of manager, bookkeeper, cashier, and lineman in his own person, according to his ability or the condition of his company. The numerous forms, applications and orders of the large city company, with its various departments and army of clerks, reduced to their lowest terms probably mean that the prospective customer meeting the manager on the street, in church, store, town hall, or other places, where the inhabitants of a small town are wont to foregather, says, "I'm thinking about having electric lights in my house; how much will it cost?" The information is immediately available, and if the price is satisfactory, William, the manager, doffs his collar, dons his overalls, shoulders his tool kit and becomes Bill, the Electrician. The job finished, he successively and successfully impersonates the lineman, the meter department, collector and accountant. His time is seldom his own, since he is at the beck and call of his customers at all times. He leaves his supper in answer to a frantic call from Blank's house to discover that Mrs. Blank, fearing a thunder storm, has pulled the main switch and forgotten it. He confers with the engineer in regard to that last barrel of oil, returning to the office to reason with a customer about his bill.

These are a few of the daily stunts of the manager in charge of the real small central station, and it is not strange that he does not find time nor inclination to grow enthusiastic over an article on the "Power Factor of Steam Turbines as Applied to Refrigerating Plants," or similar subjects. From the nature of the territory and the size of the business, his duties are varied and multitudinous and tend to confine his activities to those things mentioned. These details seem, and no doubt are, petty, but they are important to him and a necessary part of the business. The object is the same in all cases, to get the business and to make it pay. The bulk of the business will naturally be residential lighting and supplying current for the small household current consuming devices. The stores, few in number, are not engaged in that strenuous effort to attract attention which finds expression in the Great White Ways of our cities. The few small manufacturing plants or the shops are perhaps already connected. The field is a restricted one, and this is particularly true of New England outside the large centers.

Continuous contact with New England conservatism has its effect upon the man in charge and he is prone to take things as they are. And here is just where he may receive much good from the National Electric Light Association and the New England Section. One of the greatest benefits of membership is the broadening influence of association with those who labor in larger fields. He may not realize it now but he will later. Letters urging him to join too often receive immediate assignment to the waste basket, and when persistently followed up make him impatient.

All that can be done from headquarters is being done. It is up to the members themselves to boost our association. Judicious personal solicitation will help wonderfully in getting in these new numbers. Selling organizations realize this fact as is evidenced by the host of salesmen traveling up and down the country hunting business. You Class E members might do a great deal of missionary work with good results to yourselves, your customers, your employers and the association. Nearly all the small central stations handle house wiring and the sale of supplies, and the manager, who is likewise the purchasing agent, is the recipient of many calls from the traveling man. The glad smile and hearty hand clasp are not always the disguise of the diplomatic salesman, but are more often the evidences of sincere friendship built up during years of business intimacy. You would honestly like to see him join for his own good. Why not put in a good word now and then or make a side trip on your way to convention and bring him with you? When you arrive help him to get his bearings and feel at home, but don't act as if you owned him. Introduce the man from Maine to the man from Connecticut. Perhaps one would like to hear how the other procured that contract for additional street lights or induced the machine shop to install a motor.

You Class A men could approach the prospective member from a different angle. You know the central station manager in the neighboring town, have no doubt helped him out when in trouble or loaned him supplies for a hurry-up job. Run over and see him, show him the National Electric Association Bulletins and Question Box, and tell him how you appealed to headquarters for information on this and that subject. Encourage him to attend the next convention either as a member or guest. He will want to come again.

It speaks well for our organization that the resignations in Class A, though not few, are almost entirely on account of consolidation.

Consolidation may solve many of the problems of the small central station, as has been recently stated in a paper read at the Chicago Convention, but however that may be, there still remains a large field for the activities of the New England Section. It is unnecessary to state the self-evident fact that this association is a direct benefit to the consumers of electricity as well as to the producers and allied industries, but it cannot attain its greatest efficiency until it has the whole field in membership.

The President. Gentlemen, the paper is up for discussion, and I will call upon Mr. T. C. Martin to open the discussion on it.

Mr. T. C. Martin (Secretary National Electric Light Association.) I am very glad indeed, Mr. President, to have the opportunity of saying a few words directed toward opening the discussion on so valuable and important and pertinent a paper as that which Mr. Marsden has just given us. I think in these meetings if we could have more papers of that character, rather than those of the strictly technical nature, as he himself has intimated, we would be greatly the gainers.

The problem that Mr. Marsden has addressed himself to is one that you know, sir, constantly occupies my thoughts and energies as Secretary of the National body. What can we do to bring the smaller company into membership, for its own good, not particularly for any benefit it can be to us, except that it enables us to say that we fully and wholly represent the industry, but for the good that we can do the "little fellow" in his troubles. It is an exact and true statement that every smaller company taken into our membership today and enjoying, as in the case of your own association, the privileges and the literature of the two associations, the state or geographic and the national, receives more for what it pays in than it costs. In the case of the National body, our literature costs us to print and get out $50,000 a year, and taking it on an arbitrary basis, with 12,500 members you can see at once that it figures out somewhere near $5.00 per member. When, as is the case with the smaller company, the dues are $10.00 a year, of which we are very glad indeed to rebate one-half to the New England treasury, there is $5.00 left for us with which to meet the expense of carrying the smaller member. I think it will be self-evident, therefore, on that basis alone, that we are doing what we can to bring the smaller company into membership for the good of the smaller company, and because we recognize that the industry must after all stand or fall as a whole, that we are inter-related very closely whether the company be a large one or a small one. I note with interest the figures that Mr. Marsden gives with regard to the proportion of companies in smaller and larger cities, and I have reason to know that his figures as checked up from McGraw's Directory are very close to the actual fact,—are strictly correct.

I have been approaching the subject from a somewhat different angle. While the word "consolidation" is in the air, and while we see a great deal of it going on, generally I think it may be said for the good of the industry, and certainly for the betterment of service to the public, it has by no means gone as far as perhaps we would be inclined to think from what we read in the papers or see going on around us. In order for the better accomplishment of my own work, in order that I might get closer to the various groups constituting what we may call the consolidations, I have made an investigation of the subject during the past year somewhat along the lines of one that was made several months ago by the Electrical World, and I have found that, when all is said and done, somewhat less than 1,000 companies in this country have been consolidated. Now, 1,000 out of very nearly 6,000 is after all a relatively small proportion, considered numerically, although as stated in your presidential address, sir, the National body and such associations as this do represent ninety per cent. of the investment and the earnings, but still it leaves us at least 4,000 prospects to go after, and I think any central station man, certainly in the commercial department, would welcome any opportunity that embraced 4,000 prospects. That is my task in a very large measure, and it is also your own in a lesser degree, and I am very glad indeed to add my commendation here to the splendid work that is done by your clever Secretary, so devoted and enthusiastic, Miss Bursiel. My correspondence with her is a constant stimulus to me, from her deep interest in the work that is going on.

Incidentally, this brings me to one other point, which I think is of interest to us as members of the New England Section, and I have encountered here another aspect of this consolidation work. In some of the states the process has gone a good deal further than it has in others. We have practically two methods of consolidation going on in this country, one where we have a large holding company with properties scattered all over the country, as I might say in the instance of Stone & Webster, and Doherty, and Byllesby, and Tenney, and others that will come readily to mind, and in the other process we have going on, what to me—and I might say I am very much interested on both sides of the question—is perhaps a more natural and logical process, that is, the putting together of contiguous and adjacent properties, work which is perhaps best exemplified by the remarkable work done in the state of Illinois by that master mind of our industry, Mr. Samuel Insull. It will stand to reason at once that by the bringing together of these properties and welding them into one, whether scattered and under the holding company or whether contiguous and massed geographically, we are lessening the number of possible prospects in any given state or group of states. We have, for example, lost in the National Association during the past year from the operation of this very process something like thirty member companies in Illinois. We have not lost in total income, because that is taken care of along other lines and by other methods, but we have lost that number of companies, so that while we gained over 100 Class A companies during the year we actually showed a smaller number at the end of the year than we did at the beginning.

This brings me to the point and to the method which has been so well exemplified in your own association, and which I am using in my various visits throughout the country as an example. You can see that in the smaller states the few companies that can get together cannot have much influence on public opinion, whether directed toward legislation, whether, in argument through the newspapers or by other channels. I have, for example, at the present minute, correspondence going on with the central station companies in West Virginia, about a state association, and I cannot see that it would do them particularly any good except the getting together of members, the ten or twelve companies in that state, and I have urged them to get together with, say, the state of Virginia and one or two other states nearby, and follow the New England example of having a splendid group like this, which is growing in influence and in dignity and in importance and does exercise a most beneficial effect on the public opinion of every community where there is a company in service. Your example has been followed already in the great Northwest, where again we have been able to throw five states together in the Northwest Association and have a body which will very soon rival this in numerical standing. Only last month I had the pleasure of going—no, I won't say the pleasure, but I had the opportunity of going in the middle of August to Macon, Ga., to help inaugurate and set going the new Southeastern Section, and there we had, in spite of the frightful heat at that time of year in one of the hottest, and of course I must add most beautiful and progressive cities in the Union, a gathering of nearly 250 central station men. There were ladies there too. It is true that the heat compelled them to protest against having the ladies' reception, and I was made the ladies' reception by giving them my remarks to fill in the gap. I hope to see that process to which I have alluded carried on throughout the union, because it will not only lessen a great deal of work and a great deal of duplication, but I think will give us groups by which this great national body, which President Townsend has referred to as the largest of its kind in the world, will be better able to do the work it should do and live up to its mission through great federations.

As to the work that lies before the smaller company, I was very much struck while on the Pacific coast to see how far some of the smaller companies there had gone in the development of their field. I encountered many small companies, some in communities of say 1,500 or perhaps less than 1,000 inhabitants, where every house in the place was enjoying electric service, and I also saw and visited some such places where the average income per capita ranged from $15.00 to above $20.00. As to the degree of saturation, it is true the case is that of a larger city, and I do not know but what I might have mentioned it when I had the pleasure of coming before you gentlemen last year, but in Vancouver, a city rated at 125,000 population on its own estimate, and which, being that of a western city, must therefore be regarded as very conservative, there were installed on the consumers' circuits 38,000 meters. It is true that is the west, and not the conservative east which Mr. Marsden has sketched in such a picturesque manner, but after all it does show us that there is a saturation ahead of us which we don't even begin to approximate, and that that is true for the smaller town just as much as for the larger city.

I was very glad indeed to note that Mr. Marsden, although only incidentally, referred to the Question Box. With regard to the smaller company I would say that that is our great play from the national body, and I presume it must be to a great extent from the office of Miss Bursiel in Boston. The small company is in a peculiarly difficult position when it comes to acquiring information with regard to dealing with the immediate problems, and anxieties, and troubles and difficulties. The question box of the National Electric Light Association is, I think, the very best means extant for helping the little man out in such a situation, and I must confess my constant amazement at the fact that these smaller companies do not take greater and fuller and better advantage of it. If any of you gentlemen will help me in my work and give me pointers today as to how I can put it up to them so as to win them over into our ranks, I shall be deeply grateful to you and we will all be benefitted. The small central station man is virtually little better in a sense than an isolated plant. Generally speaking, he is a long way from any other men of his kind. In a city like Burlington even they are relatively very few in number, although I presume you can count the doctors and the lawyers by the score; if you cannot, Burlington must be a remarkable exception to the average American city. In the places that are much smaller than Burlington, as Mr. Marsden has pointed out, there is perhaps one man, who is Mr. William Smith in one capacity, William in another and plain Bill in a third, and he encounters from that very fact a great deal more complex questions—complex for him—than does the man in the larger company, where the work is all divided up and each department is equal to itself and each is in charge of an expert or has an expert to put on the problem, and I cannot see any way in which that smaller company can meet its problem quicker or better than through our Question Box.

We have organized today, and I think this is the first chance I have had of stating it, a system that we have gradually built up, whereby we have correspondents in 300 central station companies, so that when a question comes in from a company of a given size or of general interest we can send it at once to a given group of men and we can elicit replies at once and send that information on, very often within forty-eight hours, to the man who wants it, and sometimes we send it by telegraph. I am very glad indeed to testify again to the splendid work that Miss Bursiel has done up here in New England in taking the questions that come along in that way and in handing them out to a lot of you gentlemen. I beg to thank you personally for the enormous assistance that you give Editor Sewall and myself in the conduct of that department. If we can make that question box more useful than it is, if we can get in closer touch through it and through such agencies with the small company, I think the day will rapidly disappear when such an admirable paper as this will remain true, and we will no longer have to deal with the question of getting in the little fellow.

The President. Gentlemen, we have listened with a good deal of pleasure to Secretary Martin's talk, and I may say that in revising our Class A prospect list we found that we had sixty-nine companies that we considered as good prospects, and practically all of those prospects are in the smaller cities, cities of 5,000 and less. I think without question that the smaller company, as Mr. Marsden stated, gets greater value out of the Association than the larger one, for this reason: that they have not the trained and skilled operatives and men in the various departments to call upon, and they have not the facilities for getting the information that this Association offers.

Mr. Wilfred Smith. Mr. President: As I had not the least suspicion that I should be called upon to take part in the discussion of this paper I am unprepared.

The company which I represent is one of the smaller ones about the size of Mr. Marsden's company. I think Mr. Marsden has covered the ground quite thoroughly. I do not think of any thing to add which would be of benefit.

As to the reason why the smaller companies do not use the question box: In this connection a system of blanks which could be used in asking questions would be an advantage to the small man. The manager or superintendent of a small plant, as a rule has to run his own typewriter, and being a very busy man, is apt to let the letter writing go until a more convenient time, which never comes. I think this is one of the reasons why the smaller companies do not take advantage of the question box.

There is no doubt that the question box would be of more value to the small plants then to the large ones if they would use it. I get a very large amount of benefit from reading the questions and answers, and often find questions which I might have asked presented by some other member and answered to my satisfaction.

Mr. H. A. Sawyer. Mr. President and Gentlemen: I have listened to Mr. Marsden's paper with a great deal of interest, and being one of the little fellows, something comes to my mind that he touches on here which has been a problem with us, and that is the question, what are you going to do when there is more than one Mrs. Blank? William, the manager, can take care of one Mrs. Blank in her trouble due to the thunder storm, but what are you going to do if there are several,—that is, when there is too much of a job for William? I have found in my experience that we had a great many difficulties in being able to take care of the customer after we got him. Most everybody was on the job during tha day, but when it came to the evening hours a great many people wanted to go away, and the difficulty that we experienced was during the evening hours to take care of the fellows' little troubles,—a fuse had gone, or in a great many cases there was small trouble. I would like to hear from some of the other small station men how that is handled. I have repeatedly asked a great many of my friends who are connected with small central stations, and I have never been able to get a very clear idea of how that thing was taken care of. I think we all have our ways, and if there is anybody here that can give us an idea of how he handles it, I think we would all be very glad to hear from him.

THE PRESIDENT. Can any of the members help Mr. Sawyer out in that problem of his, and explain just the way they handle their own station? Perhaps Mr. Eugene Carpenter can answer Mr. Sawyer's questions.

MR. EUGENE CARPENTER. I know the small central station man has his problems, and they are multitudinous, but still he only gets in a day's work in a day. Now, just to touch on the talk that we have had, in relation to papers; a paper which would interest a power solicitor in a large company should interest William in the smaller company, because after all the methods of getting business are just about the same, and take a thousand men in the country and a thousand men in the city they have to be approached with very nearly the same ideas. I take exception to the last line of this title, "The Little Fellow's Problems," because, a man to handle a small plant successfully must be a pretty big man. I think a man can handle a large proposition successfully as manager who could not possibly pull over a small plant, because he has to be so diversified a man in a small plant and in a large plant he can get competent people in his different situations. One of the troubles of the man in the little plant is that he has to know so many things. One of his advantages is that most always he collects the bills, and while that is a trouble, at the same time it brings him close to his customer. I think that the complaint department is the most important department that we have, because through our complaints we keep things smoothed out and we learn of more new business through things of that sort than in any other way.

Another one of the troubles I find is in the "ads." of the large companies. Of course every fellow is in his own boat, and he has got to pull it to shore the best way he can. The big companies put current on their board for perhaps as low as one-third of a cent a kilowatt hour, and that is done I believe in Hartford, and perhaps 55/100 to 6/10 say in Worcester, and other places of that size. Of course those things are not to be advertised, but at the same time you do advertise your low rate per kilowatt selling price. I don't believe that advertising the price per kilowatt ever connected a customer in the world. I think your solicitor has got to go to the customer and tell him how much it is going to benefit him, and how much he is going to gain by the service, and about how much it will cost him per month or per year. Some of the little fellows have water power that God provided for them; they have got a power, we will say, in some little town right in the center of the town, where the construction is almost nothing. They are in a town of 1,000 or 1,200 inhabitants, and they can make a mighty good thing because of those advantages. The other little fellow may be way off on an island in the middle of the ocean; he has to buy coal, he has trouble getting it, and he has perhaps simple engines and cannot get the capital for compound engines. When you come to compare his price per kilowatt with the other fellow's, why, there is not any comparison, and yet he has to convince his customer by argument that his service is a good one. Another thing, in the purchase of lamps the little fellow of course pays the big price. The big fellows come out in their advertisements in the papers in the large cities: "We will put in tungsten lamps for so much money," which is less than the little fellow can buy them for, and the little fellow's customers get the city papers and say, "Well, why can't we do as well here as they do in this city, or that city, or the other?" I think those are little fellow's troubles that this Association can perhaps ameliorate to a degree, because I think that the big fellow can so word his advertisements that he will get his business and increase his load without putting these hardships in the path of the little fellow, and I hope that these feeble suggestions may be heeded to some extent.

There is another thing that I think will overcome the little fellow's troubles, and that refers directly to the Association here. I believe, and I think I shall make a motion before this convention ends, that no man should be permitted to come into the convention hall unless he has a card stating his name, the town or company that he is with, the size of the town, if he is an electric light man, or the nature of his business if he is a class E member, so that we fellows can know one another. Our President here, I know, but there are lots of fellows in this room that don't even know his name. Years ago, twenty or thirty years ago, when we started, everybody knew everybody and it was "Charlie," and "Bill" and "Joe"; but the business has grown, and today there are lots of fellows here that come to this convention that I don't believe half a dozen men will speak to. You cannot expect much enthusiasm from fellows of that sort, and that is one of the little fellow's troubles. If you look in the ocean you will see a lot of fish about two inches long all swimming together. Pretty soon one of the big fish will come along, and then see these little fish all jump out of the water. Well, now, if we little fellows could all get together over in a corner of the room during the intermissions I think we could talk to one another to pretty good advantage.

I am not throwing any bricks at our large neighbors, because they are good fellows; they help us out, they lend us meters and testing instruments and things like that. I have some large neighbors that I think a great deal of, and I have never gone to see them in my life that they have not been more than cordial and willing to meet me more than halfway. But lots of the little fellows are afraid of the big fellows, they are afraid they are going to gobble them up. I don't see why they should be at all afraid, and it seems to me that the attitude of the little fellow should be, if he has got a good property, to hang on to it. Supposing you have got a place up here ten miles away. There is a big fellow making current for one-third of a cent a kilowatt. What of it! If it is costing you five or six cents, why, let him build down to the town line and you build up to the line and buy current from him. Keep your identity; it helps him and it helps you. Why cannot you just as well buy current from a big fellow as to buy coal from Pennsylvania?

Another thing is the matter of capital. It has been a great pleasure to me to see the attitude of the newspapers recently, pointing out the desirability of public service securities as an investment, for I think one of the greatest of all troubles of the little fellow is how to get money. He scrimps and keeps his expenses down, and thinks that he has got to build this extension of the line up this street with money that he has earned. That is where he is making the biggest mistake ever, because he wants to capitalize all his extensions. If he puts in a new boiler or a new engine, which is not a replacement, he should have new capital to cover that. If he builds an extension up this street and gets eight or ten customers, he should use new capital for that purpose. Lots of the little fellows think that they have got to earn the money to put into the business, when, as a matter of fact, they might go to Mr. Smith, or Mr. Jones, or Mr. Brown, and say, "Here, I want you to take three or five shares of our stock." "What are you going to do with it?" "I am going to build a line up this street. For an investment of $500 I will get $125 a year revenue." He gets the money, and the result is the people of the town realize that it is a mighty good proposition and back it financially whereas, at the present time a good many of the companies are putting all their earnings back into their capital account, and they get tired and worried and think that they are losing money.

That is about all the discussion that I have on this paper.

Mr. Sawyer wanted to know how we handled our troubles. I will tell you how we handle them in our territory. It has taken us some little time to work up to this, but about two years ago we began to invest some of our money in Ford cars, and each superintendent in our districts—our districts are small, we have three superintendents—has a little Ford runabout. On the back of it is a body something like the back of an express wagon, where he can put on 700 pounds, a small transformer or anything of that sort. And then we have a trailer, which is hooked on back of that. It is a very imposing sight to see one of our superintendents coming up the street with the trailer behind him, with the line gang, some ropes, etc., on it, and possibly a dinky behind, with a couple of poles, but it is good business. The superintendent goes out in the morning. His linemen with their tools and materials are on the trailer. That trailer is a two-wheeled vehicle, that will run fifteen miles an hour without any trouble. It has roller bearings and it will carry 1,200 pounds, and a Ford car will put it up any grade that we have in our territory. Of course we don't have any very steep hills there. There is a leg on the front end of the trailer which drops down, so that it is practically a hand cart. The superintendent gets up there in the morning and hooks on to this trailer. The gang pull up the leg and get on to the back of the Ford car or into the trailer, as the case may be, and the superintendent goes out and sets his crowd to work. They disconnect the trailer, and that becomes their workshop for the day. He goes about his trouble hunting and looks after his business; then he comes back and takes them home to dinner. So he is always there at starting time and quitting time. Those things have worked out very satisfactorily, and we find that five cents a mile will pay for the gasolene, oil and repairs and practically bury the car when its usefulness is ended. We have got one car, the first one we purchased, that has run over 30,000 miles. We bought it about Thanksgiving time in 1911. The superintendent takes that car home to a little shed right side of his house. He has the station telephone on his line. Our superintendents are interested enough so that they usually stick around the house on busy nights, and if they don't, why, they have a man at the station, and if we get a trouble, why, the fellow heaves a sigh of regret, puts on his coat, goes out, cranks up his Ford car, and he is out and has it fixed and is back while some people would be dreaming about it. That is the way we handle it.

Mr. H. R. Wilbur. Mr. President, I had not expected to be called upon to discuss this paper, and I have not prepared very much.

In regard to Mr. Sawyer's question I can say that in our territory I find it necessary to do quite a little of the trouble hunting myself; but I have two districts there, with two superintendents, both of whom are interested enough in the work either to always be on hand or to have somebody on hand practically every night, and always on a night when the stores are open, and then we have one meter man who works three nights a week, on the nights when the stores are open, and he is on duty at the office. We have no generating station in operation, so that after the office closes at night there is nobody on duty anywhere except this man.

In regard to Mr. Carpenter's trailers, we have one motor cycle, which we have found very handy for light trouble jobs and fuses in houses and that kind of work, and then we have a light truck which we use for ordinary work in repairing transformers and replacing transformers.

Mr. W. P. Schwabe. Mr. President and Gentlemen: There is hardly any use my coming up to this platform to enter into any discussion after the matter has been so fully touched on, particularly by Mr. Martin, who is so thoroughly familiar with the subject from the organization standpoint, and who makes it practically a life study. It is hardly possible for anyone to add anything to it; in fact, it would only be spoiling the good thought that you should get out of it. Mr. Carpenter, particularly, has handled the subject very thoroughly from the trouble point of the small central station man. I would only add one point. The writer, Mr. Marsden, in his paper wants to bring out the fact that the small central station manager feels that he is not getting his money's worth out of the organization. I think that is because he doesn't know how to get at it. The organization is here, well fitted to give him his money's worth. If he had a contract with a physician to look after his health he would go to him when his ills came, and it is so in this case, if he will apply to the Association and make it his business to use the Question Box, and communicate directly on important matters that he wants information on quickly with the Secretary of either the Section or the National Association, he will find that his troubles will be very quickly relieved and he will get information that will be absolutely reliable. I think if every member of the Association, every Class A member, who feels that he should get more benefit from the Association; will bear that in mind, he will find that he has probably not enjoyed and made use of the information and the benefits that are at his hand if he will ask for them. The Association might help the manager as well, at gatherings of this kind, by inquiring what subjects the small companies are interested in hearing discussed. Some things may come up that are not important enough to write to the Association about, or a man doesn't want to wait two or three months for an answer in the Question Box, but if papers could be read at these meetings based on subjects that are required by members of the Association it might be mutually beneficial.

Mr. Martin. Just one moment, Mr. Chairman. I would like to correct an impression which Mr. Schwabe may have given in regard to the handling of the Question Box, and that is that we don't put the stuff on ice and keep it there for two or three months, but that as soon as we get an answer out of anybody who has any right to an opinion on the subject from his experience or his knowledge, we send it to the man who asks the question. I might add thereto that we find a good deal of difference on the part of men both small and great, or long and short, as Gibbs would say, as to asking a question. We preserve the anonymity, and we keep their identity from even those who answer the questions, although very often it leads to an acquaintance and a friendship springing up between a man who asks and a man who answers, and they get to know each other better. And along that line, in regard to what one of the previous speakers said as to their getting off in a corner by themselves. The men are smaller in the sense of perhaps the sphere that they fill, but certainly not smaller in any human or personal quality. I have had in mind, and have taken up with two or three successive presidents, and I think I have brought it to the attention of the Executive Committee, the suggestion that we form in the Association one or perhaps two committees which should consist wholly and solely of men operating smaller independent properties, and that if necessary at the annual convention they should go into session by themselves and grapple, as this gentleman said, with their own questions in their own way at their own time, and as fully as they choose. That might even be done here, as was suggested, but I cannot help but think there is the germ of a good idea with regard to our national meetings. We do, I think, give too much time and attention to the bigger questions and to the bigger companies. One of the speakers made a suggestion which I am very glad to get, and which alone would have repaid me for coming here, and that is the preparation of and issuing some blanks on which questions can be answered. As soon as I get back to New York I am going to get out that blank and send it out with envelopes to companies below a certain size and say, "Now go to it and get busy, and let me know what your troubles are and I will help you out if I can."

Mr. Schwabe. Mr. President, I simply rise because I don't want to have Mr. Martin think that I wanted to make an impression that the delay in getting information through the Question Box is at all due to the Editor of the Question Box or anyone in connection with the management of it. I have used the Question Box with very good results, and got an immediate reply that a question had been received. The bulletin that the question will be issued in naturally is not published until a month later. Sometimes your question may get in so that the bulletin will not come out for six weeks later. Then the following bulletin comes out four weeks later than that,—that is, ten weeks from the date of the question. It is possible that no one has seen fit to answer your question, and then you don't get an answer until the third month.

That is the point. It is not any dereliction on the part of the question box managers.

Mr. Martin. I hope I made my point clear, Mr. Chairman, that while we are subject to the limitations of issuing printed matter which every serial publication is subject to,—I know that some of the magazines are printed three and four months before they come out, before the date of issue,—the moment we get the question we put it up to the man or the men we think best qualified to give an answer, and as soon as we get that by the next mail it is sent, sometimes in the original but generally copied, to the person who gave the question to us. Of course everybody who gets the bulletin is subject to that delay; after all it is the man that is on the job and is up against some vital question of the hour, whose property may depend on getting some kind of help, that is the fellow who wants the quick answer. If the other fellow is up against the same kind of trouble and does not care to send in and ask us for information, that is his fault, certainly not that of the busy Editor of the Question Box or of the man who stands ready to answer the question.

The President. I understand that when a party writes the Association for information it is sent him promptly while, of course, there is a necessary delay before it can be printed and sent out in the monthly bulletins. This cannot be overcome. I know in our own case when we have made an inquiry we have received our answer very promptly. In regard to a form for answering questions, I think that would be a good idea. Mr. Carpenter's idea is also a good one, and I will recommend to the Executive Committee that they try and formulate a plan of that sort, so that the representatives of the smaller stations can get together to discuss their problems by themselves if they choose. In regard to the matter brought up by Mr. Carpenter, relative to the larger companies advertising their rates I will say that if a company has a good rate it naturally likes to advertise it. I can readily see the situation from Mr. Carpenter's standpoint, but I don't see how we can overcome it. It is self-evident that the smaller company cannot generate as cheaply as the larger company, and of course it places the burden of explanation on the smaller company, but I don't see how that can very well be changed.

Mr. W. D. Jennings. Mr. Marsden speaks in his paper of the co-operation of the traveling man. It seems to me it might be well for the Executive Committee to appoint a committee of traveling men, of one or two or three in each state or section, that might take up actively the question of increasing the membership in their territory. It often happens that the traveling man is very close to the central station, sometimes closer than the central station man's next door neighbor. In the President's address he speaks of having no central stations in Connecticut that are not members of the Section. I don't think that is quite so. I spoke to two who were not members before I came away. I called their attention to the various advantages of joining the N. E. L. A. and promised to send them papers. It seems to me the traveling men can do a great deal towards furthering the membership.

Mr. Pierce. I am in a peculiar position. I am not a member, but a guest. I don't know whether I am permitted to speak or not.

The President. You may speak, Mr. Pierce.

Mr. Pierce. I want to speak of handling what "Bill" has got to attend to. I am one of the small fellows too. In starting where I am I had to handle about everything, and we do it this way: If a complaint comes to me we have no man that we can send out after five o'clock. It is known, all our customers know it at the present time. How we led up to it was that when a complaint came to me I explained the matter to the customer. Ordinarily a fuse was blown, and by getting the desired information I could give him information so that he could repair it himself by replacing the fuse,—we leave extra fuses in all installations,—and also say that we did not consider that we had any right to interfere with another man's business, that is, the wiring,—we do no wiring whatever,—but through personal courtesy I myself went and got him out of his trouble; at that time directing his attention to the contractors, and if he could not get them to call me again. There are very few times that I ever have to go to the same place twice. They appreciate the fact that we are not really responsible for their bad wiring or anything like that, and we use the argument that if anything was the matter with their plumbing they would not call the water superintendent, they would simply go to their plumber, as the water superintendents furnished the water and not the apparatus. I have about 1,100 customers, and I don't suppose at the present time I get two calls a month.

Regarding our larger troubles, we handle them with a Ford car, the same way one of the previous speakers described, and I am the one that handles the quick car. We have a truck that we hold for emergency only, and that is allowed to go out only on large troubles. We have another truck that is a line truck. In that way we have eliminated a lot of "Bill's" job and turned it over on to the contractors.

THE PRESIDENT. I think this paper has proved most interesting. It has been instrumental in bringing out the many different views that can be taken on the subject.

One of the gentlemen discussing this paper has suggested that subjects ought to be selected which will be more interesting to the smaller central stations.

Your Executive Committee had this very object in mind when deciding on the subject of Mr. Marsden's paper which has just been discussed to considerable length.

I may say further that your Executive Committee are always glad to receive suggestions from any member, and particularly the members of the smaller companies. We desire above all things, a more active interest in this Association by the members of the smaller companies, and if they will come forward, offer suggestions and tell us what they want, the officers of this section will be only too glad to consider them, and do what they can to further their interests.

In watching the work of this section during the last year, what has surprised me more than anything else is the fact that it is invariably the small companies that pay no attention whatever to the communications and requests for information that have been sent out by our Secretary. Many and many a request for information of value to our industry does not even secure an acknowledgment. An accurate record was kept of two separate lots of letters sent out requesting certain information, and the percentage of replies was 20 and 10% respectively. The member companies replying were almost invariably being the larger ones.

In view of this one cannot help feeling that if the condition does exist the gentleman spoke about, it can be overcome by the smaller member companies taking a more active interest in the Association, and utilizing to a greater extent, the available advantages.

The next paper on the program is "Principles Governing Central Stations in Line Extensions and Various Rulings of Commissions Thereon," by Alexander Macomber of the C. H. Tenney Company. This paper, gentlemen, was selected as we felt that it was a problem that we all had to contend with —when and how we should make line extensions.

PRINCIPLES GOVERNING CENTRAL STATIONS IN LINE EXTENSIONS
AND
RULINGS OF COMMISSIONS THEREON.

By Alexander Macomber,

Charles H. Tenney & Company.

One of the most remarkable developments of the past decade, in the operation of public utilities, has been in the meaning of the word "Service." The education of the central station company and its efforts to give service has been paralleled only by the education of the public in what it may demand. That a realization of these mutual interests is apparent to the progressive company is evidenced by the attention now given to the various phases of central station business relative to service to the community. A consideration of one phase of central station service, namely, the extension of lines to afford service to the public is the object of this paper.

Line extensions from one viewpoint, may be divided into two classes, namely, those which are good business, being profitable financially from the start, and again those which may not at first prove profitable but are undertaken on account of future possibilities or other reasons.

The former class needs no consideration here, it being with the idea of obtaining data relative to methods of handling the latter class that this paper was undertaken. The writer was assured that this would be largely a compilation of statistics, indicating the methods followed, and accordingly one hundred and fourteen central station companies in New England were requested to answer certain inquiries on the subject. Eighty responded, or seventy per cent. of those considered, which appears to be a somewhat better percentage than our President has indicated in other matters of this nature.

METHODS OF HANDLING EXTENSIONS NOT PROFITABLE AT FIRST.

On the basis of the answers received, one is convinced that the one hundred and fourteen central stations referred to have one hundred and fourteen different and distinct methods of caring for line extensions of this nature. Under these conditions it is hardly possible to present any detailed comparisons or descriptions. Threating the matter, however, as a general proposition—on what basis are unprofitable extensions made—the eighty responses may be classed as follows:

I.	Extensions made with assistance of customer that is he pays a part either of the first cost or guarantees an income	58
II.	Extension made as matter of policy or in hope same will become profitable	14
III.	Extensions not considered	8
		80

A brief analysis of these classifications as far as the general data submitted permits, indicates the methods followed in handling this proposition.

I. EXTENSIONS MADE WITH ASSISTANCE OF CUSTOMER.

Considering first the practice of those companies that require the customer to share the burden of these extensions, the following classification appears:

(a) *Customers Pay a Part of Construction Cost.*

Out of the eighty companies, twenty-six require payment for the whole or part of the first cost. In case of part payment the amount is usually that portion of the investment which will make the whole proposition a feasible one. Twelve concerns of the twenty-six state that this payment on the customer's part is later rebated to him, this rebate taking different forms, as lump sums, percentage of the gross earnings of the extension or a fixed percent. of the customer's monthly bill.

(b) *Customer Pays Return on Cost.*

Twenty-three out of the eighty replies favor obliging the customer to give only a guarantee of income. Fifteen of the twenty-three base this return on a percentage of the cost of construction, while eight ask for "interest and depreciation." The percentage guarantee varies from 10% to 50%, the average number settling on 20% to 25%. It is often required that this guarantee be given for from two to five years or more, in several cases this guarantee ceasing when a definite return is reached.

(c) *Customer Pays Part Cost and Gives Guarantee.*

Ten of our eighty companies take no chances and require the customer to pay all or part of the cost of the extension and also to guarantee the income as a certain percent. of the cost. The percent. appears to be about the same as noted above.

II. EXTENSIONS MADE AS A MATTER OF POLICY.

Fourteen companies report that extensions of this nature are made either as a matter of policy or in the hope they will become profitable. The customer is not required to assume any obligation. One is inclined to believe, however, that concerns in this class are not as liberal as others, as propositions without guarantee naturally are examined closer and confined to smaller limits. In fact, many commented that such extensions were not made except as a last resort. "Policy," in this connection appears to have a varied definition, extending from liberal service to the public to an exceptional instance of the influence of the local alderman.

III. EXTENSIONS NOT CONSIDERED.

There are eight companies who state they do not make extensions which are unprofitable at the start. The attitude of this class is covered by the statements of several that a central station should not be forced to do any part of its business at a loss. It is probable, however, that a strict examination of this class would swing some of them into other columns, for after all, the term "unprofitable" extensions is a bit misleading, in that extensions made under the conditions treated are not in most cases a source of actual loss, for the terms under which they are made provide for the burden of investment and endeavor to insure interest on the money invested.

COMMISSIONS RULINGS AND COMPANY OBLIGATIONS.

Data relative to actual decisions of Commissions in specific reference to the matter of line extensions as here treated is very meagre, the writer being able to locate but one actual ruling of this nature which occurred in Ohio, being a complaint against the Cincinnati, Milford and Loveland Traction Company to compel electric service.

This is a complain by two residents of Milford, Ohio, that having made application for service, the company refused to furnish them with it unless they bore the initial cost of installing poles, wires, and other equipment required. The Ohio Public Service Commission in its decision, on May 9th, 1913, says:

> (a) "The Commission further finds that the tariff, rules and regulations of defendant on file with this Commission do not provide that the cost of such installation shall be borne by the applicant...That defendant, by the laws of Ohio and by the franchise granted to said defendant by said village, is required to furnish its service and product within said village to the applicants therefor, and that defendant cannot require said applicants to bear the cost of such installation, in and around neighborhoods and localities where the defendant's transmission system has been heretofore extended."
>
> (b) "That said defendant has heretofore supplied its other customers and consumers with its service and product without requiring such customers and consumers to bear the cost of installation, and that, by reason of defendant's requiring the applicants herein named to bear the cost of such installation, defendant has unjustly discriminated, and is now unjustly discriminating against said applicants."

The company was ordered to supply the service.

It is obvious that this phase of "service" under consideration, is a subdivision of the broad question of "reasonable service" and "reasonable return" on the money invested. This problem offers a fertile field for Commission and court decisions usually in connection with the establishment of rates. The subject is admirably treated in Professor Wyman's

"Public Service Corporations" and a brief abstract of this is worth attention.

> "On various important public services the obligation undertaken is to serve the community in general. . . . This problem may be dealt with from two points of view. One side is the exterior limitations beyond which the service need not be rendered; the other regards the obligation to render service within these limits. Thus a gas (or electric) company may not be called upon to serve beyond the municipality for which it has been chartered, but must it lay its lines through every street? . . . . When the particular services are separately considered the law will seem too indefinite to be practicable, but when all cases are taken together. . . working rules may be attained. . . . As the law now stands there are various cases as to the supply of water and gas and the installation of electricity. . . . but hardly enough as to any one as to make workable law. It is plain that the existing facilities must in many instances be developed in readiness to give service beyond the present lines since what has really been undertaken is the proper service of the whole community dependent upon the established company.* Certainly all premises situated within the network of existing mains and within convenient connecting distance should be served.** But the law will soon require, if it does not already, that the existing mains must be gradually extended as the growth of population in the community which the corporation has undertaken to serve demands the expansion.
>
> All must be qualified as in a recent New Jersey case*** dealing with gas supply where it is said
>
> > 'In short, is not the obligation to supply a dwelling with gas. . . . subject to the limitation, that there shall exist a reasonable expectation that the consumption shall be sufficient to warrant the necessary expenditure?'

The undertaking to serve a community does not therefore lay the company open to outrageous demands in individual cases, but to such service as the community considered as a whole may demand."****

*Illinois—City of Chicago v. Mutual Electric Light & Power Co., 55 Ill. App 429 (1894).

Massachusetts—Weld v. Gas & Electric Light Commissioners, 197 Mass. 556 84 N.E. 101 (1908).

New York—Moore v. Champlain Electric Company 88 N. Y. App. Div. 289 85 N. Y. Supp. 37 (1903).

**New York—Jones v. Rochester Gas & Electric Co. 7 N. Y. App. Div. 465, 39 N. Y. Supp. 1105 (1896).

Oregon—Haugen v. Albina Light & Water Co., 21 Oreg. 411 28 Pac. 244, 14 L.R.A. 424 (1891).

***Public Service Corp. v. American Lighting Co. 67 N. J. Eq. 122, 57 Atl. 842 (1904).

****Inhabitants of Quincy v. Boston 148 Mass. 389, 19 N. E. 519 (1889).

CONCLUSION.

As noted previously, the methods adopted in adjusting this question of line extensions are quite varied. Assuming that a reasonable return is to be required on the investment and the customer is to help in carrying the proposition during its otherwise unprofitable period, it is rather noticeable that in many cases there does not appear to be any definite way of analyzing the situation to show how the burden should be divided and to make clear the relation of the company and the customer. I refer particularly to the methods of solicitors and standard methods of the company in bringing this to the attention of their customers and explaining the matter. The practice of one concern seems particularly reasonable and several others evidently have used similar methods. A certain extension is to cost, say $1,000. Now the capital invested is entitled to interest, depreciation, etc., say 10%, and a reasonable return on its capital, say 6%, making a total fixed charge of 16% or $160. Then assuming the operating ratio is 70%, *i. e.*, out of every dollar of income thirty cents remains to meet interest, depreciation and profit, thus a gross income of $533.33 must be realized on the $1,000 investment, to net the $160. Until this gross income is reached the extension *per se* is unprofitable. Just how the difference between this income and the first revenue received may be adjusted depends largely on local conditions and one hesitates to offer any general prescription. Indeed the factor of local conditions is an important and often deciding one, but it is hoped that the data and suggestions here presented will at least open a helpful discussion.

The underlying principles governing the problems considered here seem, broadly speaking, to be but two, namely, that any concern utilizing its capital in a public utility is entitled to a reasonable return on the investment involved; and again, that such a company assumes certain obligations to the community in general, its most important being to render its service in the most broad-minded and liberal way consistent with its own responsibilities, co-operating always with its public to their mutual advantages.

The proposition of reasonable return on investment is now certainly accepted as axiomatic in the operations of public utilities. True, just what the "reasonable return" is, offers a happy field for argument and it must be solved in connection with the second principle noted, namely, a broad-minded interpretation of our obligations. It is interesting to note from the data gathered that ninety per cent. of the companies considered are in general acting along these lines in solving this particular problem of central station service.

THE PRESIDENT. Gentlemen, we will carry over the discussion on this paper of Mr. Macomber's to the afternoon session opening at 2 o'clock sharp. I declare this session closed.

AFTERNOON SESSION.

The President. We will now take up the discussion of Mr. Macomber's paper on "Principles Governing Central Stations in Line Extensions and Rulings of Commissions Thereon." Mr. D. S. Boyden of the Edison Electric Illuminating Company of Boston.

Mr. Boyden. Mr. President, I am sorry that the discussion of Mr. Macomber's paper did not start in directly after the reading this morning, because there seemed to be a great deal of interest in his particular topic. I have read Mr. Macomber's paper on the "Principles Governing Line Extensions," and feel that it opens a very interesting subject for discussion.

The question of possible and warranted service extensions is a source of constant study, by both engineering and executive departments of our public utilities companies, and one in which it would be very difficult to establish any uniform method of procedure or guarantee from the prospect, owing to the largely varying local conditions and the financial limitations of the individual companies. We must appreciate, however, the importance of eliminating doubtful or speculative line extensions, as money which is unwisely invested in extensions like anything else affects directly the existing subscribers in the same relation which it affects the prospect, although in a much different way. A central station serving a city, suburban and rural district, having a uniform method of charging for its current, must naturally receive a larger percentage of profit from the denser load, which comprises the business and commercial customers, and to extend the service to an outlying district a certain increment of the profit accruing from this denser business is applied to those extensions. This profit taken from the business as a whole can very properly and reasonably be extended to and invested in this direction, as it results in a benefit to the whole community.

Service extensions have been classified by Mr. Macomber under several headings, but it occurs to the writer that there are but two classes,—speculative and warranted,—and in order to determine in which class a request for service extension falls it is absolutely essential that the sales department and the engineering department study very carefully the most desirable and profitable route, and that the business, both immediate and prospective, should be very carefully and thoroughly canvassed.

As a general rule, service extensions are called for in sparsely settled or undeveloped territory, where building operations are either going on or threatened, and the highways are probably at this time under private control, in which case it is very doubtful if the central station is warranted in spending money on private property without a permanent easement on the property protecting their locations and construction, for when overhead construction is used without good and sufficient rights it may occur that you would be obliged to remove or re-locate your construction one or more times, in which case the company not only loses heavily on its investment which has not been discharged, but on the profit which would accrue from the anticipated lighting. With underground service the tenure of location is much more permanent and desirable if the necessary guarantees can be established.

Whatever method of protection is used in satisfying the investment incurred by a service extension, whether it be by guarantee or income based on percentage of the cost, this cost should include an item to cover station equipment and eventually line reconstruction, which item with many extensions becomes accumulative and represents a substantial sum, which should be available at the time when new station equipment and reconstruction are necessary to maintain normal service.

I am very loth to believe that it is good practice to allow the prospect to pay any portion of the construction when it is installed upon the highway, while on the other hand it does not appear that the company is warranted in spending any money for construction upon private property, which it is doubtful if they could capitalize. However, the security of this investment, if capitalized, is very doubtful.

The simplest and most readily accepted policy of line extensions is to require an agreement insuring the carrying charges on the investment, and oblige all subsequent customers to join in the obligation to the credit of the originator until such time as the company's interests are satisfied. Agreements may be made for one or more years for an amount equal to that required to discharge the obligation during its life.

I hope that we may hear from a great many of the members exactly how they do handle it in their particular cases, if it is different from the way suggested in the paper.

The President. I will call on R. D. Coombs, New York, to discuss this paper.

Mr. Coombs. Mr. Chairman, my opinion on the financial side of this question is probably not very valuable, but I take this opportunity to suggest a subject allied to that of the paper, *i. e.*, the construction part of the line extension. The subject, being lines generally, may be divided into the transmission extensions and the distribution extensions, and that brings up a question which I fancy may be rather important locally, *i.e.*, the action of commissions on those extensions. If it is a transmission line extension, and, therefore, presumably going some distance, you have either to extend your line on private right of way or you must go along the highway. Fortunately, I believe that the time is coming when the private right of way construction will be the proper thing, particularly if, as in some states, the commissions are to specify how you should do your construction if you stay on the highway. The Vermont commission, I understand, now has the say on every foot of line extension on the highway, either transmission or distribution, and I believe that some of those present who are immediately in touch with the situation could perhaps say something on how that is working out. It strikes me that it might work out very badly, because—and I say it with all respect to the commissions—a number of commissions do not have particularly expert advice on the construction side. They are probably very well advised on the financial and the legal side, but there is considerable difficulty in getting them to accept recognized standards of construction. As an example, I had a little conflict with a western commission on a high tension transmission line construction. The line I can honestly say was as well built a high tension line as there is in the country. It was a very heavy line. It was very well built. And yet the commission proposed that the company should change the length of the spans and guy the heavy crossing towers. The towers incidentally being sufficiently strong without any guys. They finally agreed that if the power company would make one or two minor changes, which were absolutely unimportant, they would approve the construction. It shows that municipal and commission interference, though possibly well meant, is a thing which the power companies must consider, and I believe that some oversight, some assistance perhaps to the new commissions toward getting them to adopt proper standards, will pay the power companies a great return on the trouble and cost of that assistance.

For instance, the standing Overhead Line Construction Committee of the National Association has in a number of instances been called upon unofficially to give an opinion, or to give certain information to member companies which would enable them to smooth out difficulty with some conflicting interest. As a member of that Committee I take this opportunity to say that I firmly believe that the new chairman of the Committee and any of the members of the Committee would be perfectly willing at any time to give whatever help they can to either a company or an individual member who will take the trouble to ask for assistance.

That brings up the question of "the little fellow's troubles," and frankly, some of the little fellow's troubles are his own fault. He doesn't take the trouble to ask, and it is due in my opinion to diffidence. We have had the same trouble in another association of which I have been a member for some time. The men will talk four or five hours in a corner and they will sit around in a hotel and discuss their troubles, and you cannot get them on their feet in the meetings. They won't get up in the convention and talk. It is not because they do not want to know it is because they are diffident. They have an idea that it is after-dinner speaking and that they are not experts in after-dinner speaking. Now, that is a mistaken notion. I think I am a pretty good example of that myself. The main point is: If you have some idea that you think is worth handing along to the crowd, for Heaven's sake get up and hand it.

In connection with the requirements which may be enforced by commissions or others, the so-called Joint Report on high tension crossings will, I believe, come directly into the subject of the paper, and that is by influencing the cost of the proposed extension. If you cross a railroad with a high tension line, and high tension means everything above 5,000 to a railroad, you must expect to pay more for the immediate crossing than you do for any ordinary span in the line. If you are unfortunate enough to cross a particular railroad you will pay a considerably larger amount than for the normal railroad crossing. And yet the overhead line specifications will enable you to get out of most difficulties in peace with the railroad, and so that the crossing will not be prohibitive. I believe that the more that specification is adopted the less trouble you will have with your line extensions. I am not defending the specification in its entirety, because there are some things in it that experience has shown may be unfairly enforced, and my personal suggestion is that when a manifestly unfair decision is insisted upon that the power company should fight it.

The President. Mr. Chase, do you care to discuss this paper?

Mr. Chase. Mr. President, I feel rather embarrassed at being called upon to discuss this particular question, because the problems surrounding the extension of lines in Concord are trivial when compared with larger communities. The only problems that we have in a semi-rural city like Concord are contained in this paragraph:

"Line extensions from one viewpoint, may be divided into two classes, namely, those which are good business, being profitable financially from the start, and again those which may not at first prove profitable but are undertaken on account of future possibilities or other reasons."

The extensions which are certain to be profitable at the start are certainly not problems, that is rudimentary business, and I should say that such extensions would be made as soon as possible. But the difficulty lies with those that give promise of being profitable in the future, and that opens up a very curious phase of country human nature.

As I said before, Concord is a semi-rural community, and the larger part of its area is given over to farms and our lines are pretty well flung out anyhow, but there is a constant demand to take them out farther into the farming districts. I sometimes think that if the people *on* our lines were as anxious for service as those who are not, I would soon be doing the best business in the United States. I have men come in —oh, I suppose four or five times a year, and tell me that they have drummed up a certain little community, a little collection of houses on an outlying road, and they all want electricity and want to know if I will run out there, and I say, "I will investigate at once." I go out there, and find that the man who came to see me is the one who wants electricity, and the others are all waiting to see how he likes it. That is the problem. They will not make any initial effort to have their houses wired, they won't agree to have their houses wired, and that leaves the man who actually wants it out in the cold. There have been one or two occasions where I have run an extension as a matter of public policy, because the person who wanted it was influential and I thought that it was the better part of wisdom to run out there. Those lines have since become profitable. But the demands that the farmers are making now on central stations are very interesting, very illuminating. They want motors to cut their ensilage, to run milking machines, to saw wood, and everything of that sort. The demands have been so insistent that I finally have laid down a rigid rule, when they come in to me and want a line extension I simply tell them that if they and their neighbors who want this line extension will take a few days off and cut the poles and plant them, I will send the line gang up there and string the wires and the arms, etc., and charge that expense to them, and then I will give them service. That generally terminates the negotiations.

The President. I think that we all have the same problem that Mr. Chase speaks about. Is there any other gentleman who would like to discuss this paper?

Mr. A. L. Pierce. Mr. President, I have perhaps a little information that might be of interest to the members as to what is being done by another international body of which I happen to be a life member, the International Association of Municipal Electricians, which represents largely the inspection departments with whom most of the central station men will sooner or later come in contact regarding rules. They are looking for information, and this year regarding transmission lines there has been appointed a committee of which the chairman is Dr. Steinmetz, and at this convention I understand the National Electric Light Association, the national body, sent Mr. Steinmetz as a special representative to them. There is a committee of six, I think, covering the country. Dr. Steinmetz, Harry Joslin, of Seattle, R. A. Smith of Norfolk, Va., Clayton W. Pike of Philadelphia, and myself. I don't at the moment remember the other. They have appointed that committee to get together with the national committee and recommend a certain standard for line construction, and also to eliminate, as far as possible, petty municipal interference. One of the lines which they propose to follow is to work for national control of construction, and have the transmission lines built under national control, similar to the Interstate Commerce Committee on railroads and like that. Then all those people who have to build transmission lines will have the possibility of municipal interference and various petty annoyances which you are all familiar with eliminated, and you will have a national standard for the whole United States, to which the little fellow can appeal to get his instruction and build his line, and with the assurance that when he builds it he won't have any interference and won't have to change it. This has been from the demand or desire of the members who will be called upon to pass upon this class of construction, and upon whose shoulders certain responsibilities will rest for the safety of the public. They are looking after the interest of everybody concerned and want to have an absolute authority which will back them in any decisions which they may have to render, and which will be fair to the operating companies, transmission companies, and the general public. Possibly this may be of some interest to the members of this Association. The member of the committee that spoke will probably in the course of a year be communicated with by Dr. Steinmetz relative to suggestions. This is a start. They don't expect to do anything definite this year or possibly next, but it, to my mind, is probably in the right direction. We want information, and it is for the best good of all.

Mr. Hayes. In Mr. Macomber's paper no mention has been made regarding the apportionment of cost in the matter of services, that is to say, the lines from the main distribution system to the houses. I assume, therefore, that it is common practice that the several companies shall stand the expense of service connections, in other words, that the customer shall not be confronted with a bill for the cost of construction from the line to his house. It seems to me that the central station should be that liberal.

One other point which has not been touched upon, and that is a proposition which may involve someone else other than the company and other than the customer standing one-half the expense of the line. I refer to the possibility of joint ownership of poles with the telephone company. In some districts it is a fact that joint agreements are worked out. It usually is a fact that in rural districts the telephone is the first service sought. In new city districts that are opened up it is usually the telephone that is first sought, and the telephone company usually is up against a proposition of extending their lines. Is it not logical, therefore, that the lighting company should join with the telephone company, agreeing upon the size of pole which will carry both classes of construction satisfactorily, and that both sets of wires should be on the same line of poles and each company bearing half the expense? In this way the problem would be decidedly simplified, requiring less burden upon the prospective customer.

One other thing I believe that is of importance in estimating the value of the business acquired is that we should take into consideration the possibility of the central station organization working up more business than would seem at first apparent, in other words, we should not ask the customer how much business he can give us, but we should feel, I believe, and consistently too, that once we get him for a customer we have a prospect for additional business. In other words, we should be able to increase the amount of business from that customer far in excess of any promises that he might see fit to give us.

Mr. Schwabe. In this paper Mr. Macomber cites a decision from the Ohio Public Service Commission, the only one in fact, and in this case the company was ordered to supply the service. I want to give this information. About a year and a half ago we had a case that was being pushed on us for an extension, and it was necessary for me to go into the matter rather carefully in order to be prepared to take it up, defend ourselves before the Utilities Commission, and I found at that time in my investigation two decisions that might be added to these seven that appear on page 7, that were in favor of the companies. One was by the Wisconsin Gas & Electric Commission in the case of the city of Beloit against the Beloit Gas & Electric Company, in which case the commission decided that the company was not warranted in making unreasonable extensions or unprofitable extensions for all time, that a certain time came when a company had sufficiently covered its territory and if it was required to continuously make unreasonable and unprofitable extensions it would be hampered in reducing the rates to the consumers that it already had on the line. The other decision was by the Maryland Commission. That was a case of a realty company that wanted some gas mains extended into new territory that they were developing, and the commission in that case held that the company was adopting a policy, that through their investigation of about twenty companies throughout the country was very similar, and that was that the realty company should stand the cost of the extension until the business secured on those extensions gave them a reasonable income. Those are two decisions that I consider were very helpful in our case. Our case never got any further than that a man took it up before a town council and got the citizens at a town meeting riled up, and they finally decided that the Selectmen should take this matter, together with grievances against all other corporations in the vicinity, before the Utilities Commission; but we only asked a guarantee of $2.00 a month on an extension that would cost about $250, and when that was clearly pointed out to the Selectmen they thought that if this man could not afford to pay $2.00 a month for electricity he could not expect us to make the extension, and that is where it ended.

We have a large territory, but it is scattered, and we are continually confronted with demands from farmers for extensions. "We are right close to the end of your line, and our neighbors want it too. There are four or five of us here." We ask where the neighbor is. "Well, just go up to the turn of the road and you will see his house." That neighbor is about half a mile away. We took over an additional piece of property, and the company operating it had laid down on extensions for about two years, and I expected that as soon as we took it over there would be a lot of requests for extensions popping up. We ran a series of ten advertisements in weeklies—we only have weekly papers—bearing on this line extension proposition, with a view to educating them up to the point as to what these line extensions cost, and that they must bring in sufficient revenue to cover interest and depreciation on them, and I think we were quite successful in that. We have adopted—had to adopt, of course—a policy that can be taken up by any customer that wants an extension made that is not profitable, and we have two plans: one is that we will make an extension providing the customer will guarantee sufficient income to make that extension bear its cost; the other is that he pay the difference between the amount that we are justified in spending to get his business and the actual cost, this difference to be returned to him when that extension has secured sufficient business to make it profitable.

Mr. Sands. I would like to ask Mr. Schwabe, if I might, on what basis he figures that return that he asks the customers to guarantee.

Mr. Schwabe. Well, to be specific, almost as outlined in this paper. We will say that the line part of an extension costs $200. We usually figure that the service, meter, etc., is something that we would expend for any customer along the line; we don't figure that, but if the cost of the extension is $200 we figure about twelve per cent., say six per cent. interest and six per cent. depreciation.

Mr. Sands. For how many years, Mr. Schwabe?

Mr. Schwabe. Why, until the additional business on there will bring us that income.

Mr. Sands. Thank you.

The President. Any further discussion gentlemen on this paper?

I have listened with a great deal of interest to the reading of this paper, and also to the discussion.

I have been connected with several companies in the United States and Canada, and have found many schemes devised to handle this matter, and have tried to work out others, which have all been more or less unsatisfactory. In my opinion, no general rule can be laid down that will satisfactorily take care of the problem of unprofitable extensions as they come up from time to time.

Since the passage of the Rhode Island Public Utility bill, our company has hesitated to make any arrangements with the consumer, whereby the consumer stands all or a part of the cost of an extension, or any part of the fixed charges on same. The act specifically states that we cannot discriminate, that is, we shall not charge one consumer more than we do another for service, and we have taken the stand that if we charge a consumer a certain portion of the cost of line construction, or a percentage in the way of fixed charges on the cost of an extension, that whatever the consumer pays to us over and above our regular charge is bound to work into the cost of his current. You can call it what you like, but I am convinced that it is a part of the cost of his service.

Since the passage of the act, our company has adopted a more liberal policy, feeling that any reasonable extension should be made if it is not very profitable from the start, and I think that this can well be done, especially in sections that are growing.

Of course, if a party asks for an extension that is entirely unreasonable, we explain the situation to him, and we do not attempt to make any arrangements with him, but simply let the proposition wait until it works itself out, as it generally does in a short time in a growing community.

MR. CHASE. Mr. President, may I ask you what you call a reasonable extension?

THE PRESIDENT. We have sometimes worked on the basis that if the estimated earnings on an extension equal the cost of the extension in two or three years' time that it would be a fairly profitable one. We have in many cases, gone considerably beyond that period, in sections that are building up very rapidly.

We have also in the past made arrangements regarding extensions whereby the customer or customers who wanted the service, would guarantee a certain minimum gross, the net of which would return us from 20% to 25% on the cost of the extension to cover interest, depreciation and profit. This guaranteed minimum gross to continue until the gross earnings of the extension had increased sufficiently to net 20% or 25% on the cost of the extension.

Mr. Chase. Have you any definite distances that you will extend without any assessment of cost to consumers?

The President. Mr. Chase, we do not have any definite rule. We have found in practice that each extension has to be worked out from a purely local consideration, that is, the available business at the start; the prospect of future business on the extension, and the length of time it will take to develop that business, must be taken into consideration.

Mr. Chase. What I meant was, under ordinary circumstances would you extend six or eight poles for instance?

The President. We do that, without question, in any section that is growing.

Mr. Chase. I should like to state that we do that, all of that, without question. We extend six or eight, and sometimes ten poles for a nice little piece of business. But last winter I extended eight poles to a house in an outlying district upon a guarantee, or apparent guarantee, of about $25 a year, and three months after the extension was made the house burned down and they moved away and left us up in the air.

The President. We have had that same proposition. But any extension of say under $500, where there is reasonable prospect of new buildings going up, we make without any hesitation, and of course in certain districts we go beyond that. It is the question of development in a district that decides it as a rule. Since the passing of the act, however, we have decided not to attempt any arrangement with the consumer.

Mr. Lawton. We have a system in vogue in Hartford which no one seems to have tried, or at least it has not been brought up at this meeting, for taking care of our suburban towns. We will agree to extend our residential lighting mains, into any district where the town will install street lighting. That seems to have worked out very satisfactorily to the company and also to the consumer. It carries the residential lighting circuits so that they cover the entire center of the community and go pretty well into the outskirts, and also give us a return at once, a small return, on our initial investment in the shape of street lighting.

The President. Any further discussion, gentlemen?

Mr. Boyden. Mr. President, I would like to say a few words, to ask the gentlemen present what they consider a reasonable amount of business or a reasonable amount of guarantee. The President mentioned making an extension of five or six poles without any guarantee, only his estimate of the amount of business. If you wanted to look at it in that way you might say that you could discontinue 90 per cent. of your customers and only reduce your income approximately 10 per cent.; then of course automatically to the few customers left, who would be large ones, you would automatically reduce the rate, so it must be that you do take profit from the profitable business to put into line extensions. Now, what is the reasonable amount that you should take for that purpose? That is the question of how much benefit we give the community by serving all its people. In Boston we make an investment for any customer without any questions to the extent of $75. We would spend $75 for a street light. So that if an undeveloped territory want service we get the prospects together, and they call on the town for street lighting, and with that arrangement we make a warranted extension and don't see any discrimination or any possible way in which a prospect can say, "Well, you extended to this fellow's house and he is no better than I am, and it won't cost you any more to come to my house." In that way, with your guarantee for anything over the available amount, we have very little complaint. I wish someone who has given this a good deal of thought could lay out some rule how they determine the reasonable amount of investment or the reasonable income that they expect to receive from an extension.

The President. Mr. Boyden, I have been unable to find anybody that has laid down a definite rule. We have attempted to, but we have found that each individual case brought up a different phase of the matter, and we have had to decide each extension that was asked for on its own merits. Is there any further discussion?

Mr. Rollins. I would like to ask Mr. Boyden, Mr. President, if that $75 that he expends is exclusive of meters and transformers for each customer.

Mr. Boyden. That is exclusive of meters and transformers.

The President. Is there any further discussion, gentlemen, on this paper? If not, I will ask Mr. Macomber to close the discussion and to answer Mr. Hayes' question in regard to the matter of services and meters.

Mr. Macomber. Mr. President, it must be borne in mind in reading this paper that it only touches one phase of this question of line extensions, namely, the unprofitable extensions. I have not attempted to go into this subject broadly on all line extensions. But I think it has brought out some of these problems that the central station man is up against, and it certainly shows a condition existing that is not quite in line with our attempts at standardization on different methods of operation. However, it comes down, in my mind, largely to a question of local conditions, based, however, upon the general principles that have come up here. Local conditions must govern the policy; I don't see any way to get behind that.

Mr. Hayes has brought up the question of whether or not it should be proper for a central station to pay for the service at the end of the extension. It seems to me that it is only fair that they should do that, just as on any extension that is undertaken the service is put up without cost on the same basis as the meter and transformer. That has also been decided by the courts. I cannot just remember the decision, but it is referred to in one of the decisions quoted here and was ruled upon as being proper to do on the same basis that the central station must furnish the transformer and meter and not charge for them; so that has been authoritatively settled, although I cannot actually cite the decision at present.

Mr. Schwabe referred to two other decisions, and I must explain that he was kind enough to write me about those and I intended to add them to this other list. They were the last ones on the list, and unfortunately they were omitted. However, the decisions already quoted are the basic decisions and are referred to in those decisions. The Beloit decision was based originally on this question of reasonable return, rather than on an actual extension proposition. The Maryland decision came under the same general heading as the New Jersey gas decision referred to.

Mr. Coombs brought up the question of construction, which has not been treated in this paper, as it brings up another field. To my mind, however, the question of construction is going to be given more serious attention in the future on the part of commissions than it ever has been before. There are going to be requirements that the stations have got to meet. I think that a ruling of the commission of the state of Vermont is rather significant. In General Order No. 4 it requires every central station that desires to make an extension of even a pole across the street to apply for permission to the commission to run across the street, even at 110 volts. I don't believe there has been any contest of that decision as yet, and it will be rather interesting to see how it is received in general, but it indicates the tendency along the line of regulation.

The President. In appointing the nominating and auditing committees this morning I neglected to appoint the chairmen. I will now appoint Mr. H. T. Sands as chairman of the nominating committee, and Mr. H. A. Gidney as chairman of the auditing committee.

I have been asked to call attention to Mr. Parker's invitation. Mr. Parker, Manager of the Burlington Light & Power Co., extends an invitation to the members and guests attending this convention to visit their new hydro-electric development at Essex Junction. He has provided for a special car or cars Saturday morning that will be in front of the hotel at 8.30 A. M. They expect to return in time to catch the train leaving Burlington at noon. All those desiring to go will kindly register with Miss Bursiel.

Next on the program is a paper entitled "Some Phases of the Merchandising of Electric Appliances," by W. G. Stetson, Edison Electric Illuminating Company of Boston.

MR. STETSON. Mr. President, gentlemen. The title of this paper is "Some Phases of Electric Appliance Merchandising," and there should be an invisible parenthetical note reading "As I have found them."

"SOME PHASES OF ELECTRIC APPLIANCE MERCHANDISING."

BY W. G. STETSON,

The Edison Electric Illuminating Co. of Boston.

It is rather unfortunate for the central station that it has spent so many years forming the habit of mind of regarding electric appliances as a joke.

Even today when the larger central stations are realizing more and more that the widespread sale of appliances is going to increase their load in a mighty desirable way, the men in charge of the selling work are apt to approach the problem somewhat in the same spirit that they have regarded the whole matter in years past.

This attitude of mind is illustrated in the very name which many companies call their Appliance Department, if they have any; that is, Appliance Exchange—a place to swap things, to trade off something that is new for something that has become obsolete, instead of a shop where merchandise is sold to the public on the basis of value received on both sides.

I do not know of any other company beside our own where the separation of the appliance sales from the sales of current is so complete as in our Boston organization, but many companies are establishing Divisions or Departments of the Sales Bureaus wherein appliances are handled as a separate matter of business. This is in strong contrast to past years when the commercial men who were selling current used odd moments, or spare time, if they had any, to dabble a little in appliance sales without any real knowledge of either the goods they were selling or the requirements of their customers.

It is this whole policy of the central stations to regard electric appliances as a side issue that makes it so hard for the companies individually, or any convention assembly, to talk on the subject in a plain, simple, matter-of-fact way that any collection of salesmen would talk about handling sales of any form of merchandise whatever.

The commercial men attached to central stations are most of them in the class of life insurance solicitors. They solicit well and they get a lot of business, but they do not sell anything. It is hard for them to assume the attitude of mind which is absolutely necessary to put the handling of electric appliances by central stations on the same plane as the selling of any other form of necessity, or luxury, that is sold to the public today.

For the sake of clearness, I have divided this subject into four heads, namely: Purchasing, Advertising, Selling and Service, and I am assuming that you will all agree with me that the ideal situation to be reached, so far as electric appliance selling is concerned, is to have established in every community well-run shops in which all the world and his wife can purchase electric appliances for their needs, in the firm conviction that they are getting what they want and that they will be properly treated all along the line. For the purpose of this paper, I am regarding the central station as a retailer, and, therefore, in the same category as the shop above mentioned.

Let us assume that the following is a statement of the experience of a man named Smith, who contemplates starting an electric shop, and who, in the course of a few months, makes certain discoveries in regard to the business which he is attempting to set forth for the benefit of someone else.

PURCHASING.

Smith finds, in the first place, that the purchase of an ordinary electric appliance is a fearfully complicated piece of business. He does not know whether he can buy it cheaper from the manufacturer or the jobber, the wholesaler or retailer, or the central station, but he does know he can buy it in most cases from all of them and at prices which either vary extraordinarily, or, what is still more extraordinary, do not vary at all.

Having been in other lines of trade, Smith naturally supposes that the manufacturer sells exclusively to the jobber or wholesaler, and the jobber or wholesaler sells exclusively to the retailer, who, in turn, sells exclusively to the public. He now finds to his astonishment that it is perfectly possible for any one of his customers to walk into the General Electric Company's office in Boston, and presumably in other cities, and purchase one electric appliance, if of an industrial nature, at exactly the same price that the customer can purchase it from him, perhaps for less. He also finds that the customer can next walk over to the Simplex Electric Heating Company's factory in Cambridge and buy one range or one flat iron, or one anything, and pay no more for it than the customer would pay if bought in Smith's own shop. This is an entirely new situation to Smith and it discourages him a good deal. It discourages our own central station salesmen who work up prospects with some difficulty only to find that their sales have been taken away from them by some manufacturer or wholesaler, and how much more must it discourage Smith whose livelihood depends on just such orders and nothing else, and how are we going to encourage the retailer to go into the business if he is to be discouraged in this way.

The central station has always taken the attitude that the more people who were selling devices the better for their business, but they erred in unconsciously including the manufacturers and jobbers, whereas, I believe it to be a fact that every time a manufacturer or jobber sells at retail he discourages one or more retailers, whose opportunities might permit them to sell six articles to the manufacturer's or jobber's one.

Another difficulty that Smith encounters in purchasing his stock is, that when he comes to go to the central station, the natural fount of wisdom, from his point of view, on all electrical matters, and asks for information regarding what makes of appliances he had best investigate, he is handed a line of talk which is described by the average central station as "preserving neutrality." In my opinion this form of neutrality ought to be canned, not preserved.

When Smith asks the central station men what the best vacuum cleaner or washing machine is, he may be shown a line of fifteen or twenty of them and told, "they are all good." They are not, and the central station knows it, but their idea is to keep friends with all manufacturers in the world, thus trying to carry water on both shoulders and the back of the neck at the same time. The electric appliance that is absolutely right is going to sell in every city in the United States, just as Stetson's hats do. The article that is only partly right, but is as right as the manufacturer can make it, is going to sell in some cities and not in others, and it is a good deal better for any manufacturer to have his article pushed whole-heartedly in Chicago and not sold at all in Boston than it is for him to get only half-hearted selling in both cities. The whole collection of retailers or central stations is not any different than the collection of Department stores, and all of the Department stores in Boston do not sell every make of shoe that there is known. Each Department store picks out his or her favorite one, two or three makes of shoes and pushes them for all they are worth, and they get the sales. If they tried the other method they would not sell anything, because when Smith, or a customer, is shown a row of vacuum cleaners or washing machines and is told they are all good he thinks to himself: why, if you do not know which is the best one yet I guess I had better not buy any of them until one particular make sticks out as being so much better than the others— that is the one I want to carry. Smith, you see, is not going to get a great deal of help from the central station.

About the only other difficulty in purchasing is the fact that some of the best lines have such high re-selling prices that Smith does not dare to buy them. We are told that this is because the manufacturers have had to experiment so much and somebody has to pay for the experiments.

Surely, the time is now coming when the state of the art is changing with less rapidity and when the manufacturers ought to be able to reduce, as they have done in some cases, the cost to us of their material in order that the re-selling price may be within the reach of the average customer.

ADVERTISING.

I asked a sales manager the other day what qualifications a man ought to possess to be a window dresser for an electric appliance shop. That may sound like a very startling thing, for an electric shop or a central station to have a window dresser, but it is not a bit. His reply was that the man ought to have had experience in selling household goods, hardware and jewelry. I think that reply comes pretty near describing the kind of advertising that Smith ought to do to get business.

He has got to have the right kind of shop to sell his goods in. Advertising does not consist of type and a newspaper entirely. You can gain advertising the minute the customer's foot touches the pavement in front of your store, for you want to let the outside of the store welcome the customer, and that is not difficult.

Smith can find a dozen great concerns who run chains of shops and do that sort of thing, like Huyler's and the United Cigar Stores. He has got to make his shop attractive enough on the outside to get his customer into it, and after a customer gets into an electric shop he ought to be shown the appliances in just as nearly the same atmosphere as they are going to be used as it is possible.

Most electric appliance shops have a lot of glass cases around the walls with heavy doors on them, and if a salesman wants to show a customer an appliance, he has got to open the door and lift the appliance down and then he has no place to put it and has no way to connect the appliance up to show the customer what it does and how it does it.

Smith finds that he has got to put his merchandise on serving tables where the customer can see it, pick it up, open it, play with it, if you like; five cents' worth of nickel polish will take care of the tarnishing that either the customer or the air does, (I gave this paper to a manufacturer of goods, and he gave it back to me and said there was one criticism to offer, that there was not such a thing as nickel polish made, but he very kindly told me that hot water and soap and elbow grease would do just as well. So I put that in now as an addendum) and if there is a row of outlets in the chair rail so that the appliance can actually be put to work, so much the better chance for a sale.

Smith finds that the central station has a fine lot of baseboard outlets, and that everybody around the shop talks about base-board outlets. He knows there is not a woman living who will stoop if she can help it, and he has got to talk about chair rail outlets if he is going to make it easy for his customers to use his goods.

Electric appliance advertising is just like any other advertising and should consist of the following:

Seasonable ads in newspapers. Leaders, as they are called, or a special lot of appliances sold at a reduced price to attract trade on other appliances. Bargain sales once in a while, if you have really got a bargain, or if you over-bought last year and want to get rid of last year's stock. Attractive, live window displays; by that I mean alive, rather than live—somebody in the window doing something. A dead window display is not worth much. A collection of inanimate objects in a window is not going to attract much attention, but a man or a woman or a moving machine in a window doing something with the objects will increase your percentage of attention on the part of the public from something like 5 per cent. to nearly 70 per cent., as has been found by actual test. You do not need to have a circus parade and buffoonery, but Smith knows that most central stations are altogether too dignified and he has noticed, too, that most contractor's windows look like the funeral wreaths we used to hang on the wall in a picture frame under glass, only the glass is off and the dust and the flies are on. And Smith knows that the contractor is to be the only retailer there is outside of the central station, and that he cannot learn anything from the contractor, and he is sorry to find that he cannot learn much from the central station.

SELLING.

About the hardest thing that Smith has to do is to find sales people who know anything at all about electric appliances. He interviews the central station and he finds that for some time in conjunction with contractors, jobbers and manufacturers, as in the case of the Electric Development Association of Boston, they have spent thousands of dollars to educate the public to the use of electric appliances and have not spent five cents to educate themselves or anyone else how to sell them.

He finds they are in the position of the man who advertises a big bargain sale of some article, and when the public comes pouring into his shop to buy the article he has not got anybody to sell it, and the whole value of his advertising has gone. The public needs instruction as to the value and economy of electric appliances, but the dealers, all of us, are in far more need of education than the public; it being useless to persuade an individual to come into your shop to purchase something if you are wholly or partially unequipped to deliver the goods after he comes in, or to tell him what kind of an article he wants and ought to have.

If Smith could get salesmen that simply knew their business there is plenty of enthusiasm on the part of the public to buy the goods, if they are merely asked to and are asked to pay a fair price, and by a fair price I mean the gross cost to the retailer, plus a fair margin of gross profit to cover the expenses of doing business and give a return on the investment. Price cutting is not of any use. Everyone knows that you cannot increase your permanent volume of sales by price cutting. Read Mr. William H. Ingersoll's article on "Price Cutting" and there is a lot of truth, too, in Louis Brandeis' article on "Price Maintenance."

There is not any known business that ever was brought on a firm basis without recognition of the necessity of selling goods at a profit, and the central stations in the past have obscured the issue and discouraged the retailers by getting the great income to be derived by them from the use of electric appliances so close to their eyes that they could not see that the only way to increase the sales was on the same sound basis as the sale of every other form of merchandise.

SERVICE.

Smith knows that when he starts a retail store he has got to set aside some percentage of his gross profit to take care of service to his customers, and that the percentage so to be set aside in the case of electric appliances is greater than in the sale of most other similar articles.

It is not enough to sell an electric toaster, it has got to be kept in service, because if a customer buys it and something happens to it and he stops using it, after a little while the sight of that useless toaster standing on the shelves of his pantry will stop him from buying any other kind of an electric appliance for a long time, even if the other kind is a thousand times better than his toaster was.

It is of just as much value to the retailer to have the customer keep his electric appliance in service as it is to the central station, and the trouble with the retailer has been that he has looked at the profit on the first sale and cared nothing about the customers or the device afterwards. In this single instance the central station has gone him one better by taking care of the appliances and keeping them out on the line where the customers are getting satisfaction out of them, and buying others because of that satisfaction.

That is what Service means in the electric appliance business, and it is just as important a factor in the growth of business today as is advertising, of which, in fact, it forms a part.

In conclusion, I want to appeal for real co-operation between the manufacturers, the jobbers and the retailers.

I want them to get together often, to educate each other more thoroughly and to try and solve each other's problems.

I want to see some of the money that has been spent for the education of the public, spent for the education of the trade, and when that education is completed, co-operation will be automatic and we will not have to try for it—it will come to us.

THE PRESIDENT. Gentlemen, we will open the discussion of this paper, and I will call for Mr. E. M. Addis of Brattleboro.

MR. ADDIS. Mr. Chairman and Gentlemen: The call on me to discuss this paper is entirely unexpected. I remember that when I stepped on the Convention Special at Bellows Falls in going through the different cars I chanced to meet an acquaintance. This friend grasped me by the hand and said, "Well, Addis, going up to the convention to start something again this year?" I replied, "No, I am going to keep quiet."

The subject of this paper is certainly of vital interest to every central station man, and I feel that along the general lines, as applying to the central station man, what Mr. Stetson has said is very true, particularly the alive window. Unfortunately many of we central station men are not so situated in the community which we serve that we have the advantages of a display window large enough to accommodate an alive subject, so we have to depend more or less on a display of inanimate objects. This we provide for when a salesman comes along with something new. Well, we say, that looks pretty good. We will buy a few of those to put in the show window, and charge it up to advertising. In a couple of weeks, when the flies and dust have accumulated on the wreaths, we take them out.

The comparison Mr. Stetson has drawn between the central station men and the department stores I don't believe applies particularly. We may say that there are several department stores in a large locality and none in a small town and there is generally only one central station office in any locality. Mr. Stetson makes the point that a row of vacuum cleaners, fifteen or twenty of them, are on the floor in the central station office, and the manager says, "Take your choice." There might be, as Mr. Stetson says, several department stores in a locality each of which would specialize on some one or two vacuum cleaners. Now in that case probably all of the various types of cleaners on the central station office floor would be pushed by the combined efforts of those department stores.

What we try to do, in our case, is to give our customer his choice of several good cleaners and if we should specialize on one particular cleaner to each of our inquiring customers perhaps the jobber who sold us the rest of them might say, we were showing discrimination and were not co-operating. That charge of course, we would not like to have laid at our door at this stage of the game.

I feel, and it has been my experience, that if you have several appliances on your counter and you give the customer his choice, he is not quite so apt to think that you are booming one particular piece of apparatus for the reason that it consumes more current than another or is more profitable for you to sell. They are pretty sceptical nowadays, gentlemen. The average customer is getting educated to this current consuming business, and if he is not getting wise from his experience he is being told by a number of co-operating contractors you have in your different localities. In fact, I have had some experience in that line. So it has been my practice in my locality to let the customer pick out that particular piece of good apparatus, which will accomplish the same thing, from his own choice of several.

Suppose we have three flatirons,—all good flatirons. Nobody can gainsay the fact that the General Electric and the Simplex are good flatirons; they are both good. If I lay those two makes of flatirons, including the Westinghouse, on my counter, and say to the customer, "There are three flatirons, they are all good." I don't think I am telling a falsehood; I don't think I am trying to sidestep the issue a little bit by telling him that there are three good flatirons. More often than not, the lady picks up this one and she tests it; it doesn't hang quite right. She picks up the next one, and that seems to suit her a little better, and perhaps she will decide on taking the third one. Supposing I had simply laid one flatiron down in front of her and said, "There is the best flatiron that is made on the market,—there is absolutely the best flatiron." "Well," your customer asks, "how do you know it is the best flatiron? You have only this one brand in your stock." Well, what are you going to say? You have not the others even to compare with it. If she should ask you what is the particular point of advantage in this make of flatiron over any other, you can't say this one hangs a little better, or this one has got a sharper point, or a hotter point, or whatever you are a mind to say, you have not got the chance because you haven't the others in stock to compare with it. "Well," she says to herself, "I guess I will wait a little while. Perhaps I will go up to So and So's place and see if he has got anything different." And you may have lost your sale and you may not.

There is another subject that Mr. Stetson brought up, and that is, "not keeping these appliances in use," and the idea of keeping the different implements in use after they have been once sold is a mighty good one. I have been in the homes of my customers and frequently found the coffee percolator upon the top shelf of the sideboard and asked why they did not use it. Maybe the glass top had become cracked, or the cord had become broken, or the heating element had been burned out some time or other by going away and forgetting it and letting the contents boil out. That is just the condition where we central station men can step in and relieve the customers of the—well, the state of mind they may have gained that the implement is of no use. If we follow up these sales and inquire periodically, "What is the condition of your flatiron, of your toaster, of your disc stove, of your percolator? Is it working satisfactorily?" We can keep those different implements in use. Right there is perhaps where the contractor loses some of his enthusiasm, or the department store —by looking on the sale solely from the viewpoint of the profit made at the time the sale is closed, and leaving it to good luck that the central station man gets his share of the profit by the sale of current consumed by that device. There is a great field in that direction for us all to take seriously and keep the ball rolling.

I don't know that I have further comments to make. The paper in my estimation is a splendid paper and presents facts to us very strongly, hits some of us good and hard right on the top of the head, and I think we should accept the paper in the spirit in which it was written.

Mr. Stetson. Mr. President, I have neither an elastic memory nor an ability to make notes. May I reply as the speakers proceed? If this is real discussion, may I reply to the discussion?

The President. You may.

Mr. Stetson. In the first place, in the matter of having a window in which you can display goods, my only suggestion is that if you have not got a window where you can display goods you had better go and get one. The answer to that is of course, "I cannot afford it," and I say you cannot afford not to have it. In regard to reducing the number of makes of devices which you carry, I never intended to indicate that you should go and mortgage yourself to any one manufacturer, because we in Boston, for instance, repair free of charge four makes of flat iron: The General Electric, Simplex, Westinghouse and the Universal, for various reasons, and I always believe you should carry more than one make. I simply object to the difference between fifteen or twenty and two or three. I think those were the principal points that were brought out.

The President. I suggest that Mr. Stetson take a seat up near the front of the room. It will save time. We want to give the manufacturers a chance on this paper. Mr. Ingalls of the Simplex Electric Heating Company.

Mr. Ingalls. Mr. President, like so many others I have to plead being unprepared to speak.

That portion of Mr. Stetson's paper that appeals strongly to me as being a live subject is that part which relates to his resale prices on apparatus. That is a question which I run into almost daily. It is coming up latterly, especially in regard to the sale of electric ranges, and it has to do with the relation of the central station and the contractor in the town. It does not usually crop up in the very small towns, because in those places the contractor has no store, makes no attempt to get that class of business; but in towns of 5,000 or more there is generally some dealer who is making some sort of an attempt to get business on appliances.

Now, in regard to the matter of flat irons, wholesale prices have been so reduced lately that central stations can sell at a very attractive price to the public, which will leave them a fair margin of profit and also a reasonable margin of profit to the dealer, so that unless it is the desire of the central station to cut absolutely to cost on irons and run a cut price sale there is no reason for selling below what is a satisfactory margin for the dealers.

On the heavier apparatus, such as ranges, resale list prices are high anyway. The first desire of the central station is to get its selling price as low as possible, so they say, "Well, we will purchase this range for $60; we will try and sell it as close as possible, and we will set the resale price at $65." That obviously cuts out any possible sales by dealers. They may get some indirect revenue from the wiring, but they feel that they have been edged out of the business and can do nothing. It is entirely possible for any central station attempting to get business on the larger apparatus—or the small for that matter—to simply get together with their contractors and come to a compromise. Take, for instance, in the case of ranges. The dealer wants to sell at list, we will say $90 or $100. The central station wants to sell at cost, $66. Let them compromise and set a resale price of, we will say $85, which is a reasonable margin on both sides. If the central station feel that they should and must sell at cost still, let them refrain from so doing, and make a selling price which will give them a profit and instead of turning the money into the treasury let them put it right into their appliance advertising appropriation. They will, as I have always argued, sell more apparatus at a price which will give them a profit and then turn that profit into their advertising account, than they possibly can by selling at cost and having little or no advertising appropriation.

I had an instance in a little town south of Boston where just such a condition cropped up on electric range sales. The central station wanted to sell them at $66, or at less than cost. The dealer wants to get $100. They get together and they say, "Now, we will set a price of $85 on these." The dealer says, "If you make that arrangement I will put a range in my show window." The central station does the same thing. They both get out and work together, and the net result is a few sales by each of them,—an entering wedge,—and the business started on a firm foundation.

Very often there seems to be no inclination at all for the dealer to get next to the lighting man, the central station man, or the other way around. They are right in the same town and working toward the same end, and yet they can't seem to get together. It is very delicate ground for a salesman or for a manufacturer to tread on, to make suggestions either one way or the other, yet there is a sore spot, and it is so in almost every fair sized town. There is no doubt at all in my mind that where the central station man does sell at cost in the size towns mentioned he is losing valuable business in total sales.

Mr. Stetson. No argument, sir. I agree.

Mr. Cooley. Mr. President and gentlemen: Commenting on certain thoughts suggested by the admirable paper just presented by Mr. Stetson, it does seem regrettable that there is no more definite uniformity in the commercial exploitation of the electric industry. It is like the perversity of fate that a profession so essentially scientific and exact in its conception and character should so often be treated, as to its commercial conduct in an experimental, changeable and vacillating manner. Attempting in part to analyze the situation, and beginning with the manufacturer, who has presumably designed and constructed his product in the best state of the art, we find quite a gulf between the factory and the ultimate user. In marketing some of his product in large enough orders a representative directly connected with the organization may handle and complete the transaction, but there is a very large class of appliances, some simple in design and construction, affording little profit as individual sales but large in the aggregate money value and current consumption, that cannot be retailed profitably. It is this class of goods and this character of possible customers that furnishes one of the problems confronting the business today. Fortunately the creation and present existence of centralized electric stations is a long step forward in spanning the gulf, and it is unnecessary in this presence to detail the many obvious reasons why the central station is a splendid and proper medium for the merchandising of much of the product. The exploitation of current consuming devices means the consequent sale of current as well as of more distributing material and apparatus, and it is of obviously apparent benefit to both the manufacturer and central station to help each other. We must recognize the continuing interest of these two principles, due to the necessity of continued service. The actual sale of most other forms of merchandise definitely completes the transaction, but in the electric business many appliances are not well understood by the ultimate users, the spectacular phenomena following any error startles and mystifies the user, and the constantly recurring receipt of bills for current is a periodic reminder of the proper sanctuary to resort to when in trouble or in need of advice and recommendations.

The relationship is intimate and full of unlimited possibilities. The manufacturer cannot and usually does not shirk his responsibilities, neither can the serving station afford to ignore its own peculiar obligations without loss of patronage and prestige.

The question of other mediums of distribution is too much involved to comment upon now, being covered by other contributors under the title co-operation.

As to the question of appliance departments carrying exactly similar lines of goods but of different make, experience has repeatedly shown that unless the lines differ radically in design and object the result is unsatisfactory and purposeless. From the attitude of the user, who is all important, there should be a best, and he really does not want anything else, although he may have to be humored in the selection. An appliance salesman should know what are strictly the best goods, have them available for sale, believe in them thoroughly and adroitly push them. If the unfavored manufacturer feels aggrieved, never mind, there is no room or time in the commercial world for a poor loser, and he has plenty of recourse. The fault is in his own organization. Either he does not produce the best and most adaptable goods, or his sales representatives are incapable, and the quicker he realizes these facts the better for his future.

This suggests another phase of the situation, and a remedy for the really superior manufacturer, assuming that he does actually produce the best goods at the best prices, and it is that in the end, sooner or later, he is bound to win out and have his own product favored, for if he is unfairly discriminated against the harm and punishment may fall on the persons thus responsible, as it is one of the privileges of his superiors to determine the best goods, and best friends are not to be discriminated against. Large orders and favoritism to the best producer can be justified, and to just that degree obligate the recipient to respond in kind by lower prices and innumerable other kinds of invaluable assistance, like co-operative advertising, training of salesmen, etc. Patronage is bound to be reciprocated. In these days of complex activities, of financial complications, with interlocking directors, banking interests, controlled subsidiaries, etc., it behooves every member of all branches of the business from producer to user to justify his right to his position, to enjoy earned, not unearned, favor. No special unjustified protection for every applicant is going to result in any other effect than to retard economical business methods, and furthermore, invite reprisals. Only by free, untrammeled competition, will the best product and methods be evolved and merchandising of electrical commodities become more of a science.

MR. J. T. SHANNON. Mr. President and Gentlemen: In behalf of the central station, I really think an apology is due the manufacturer in this instance, inasmuch, as they have produced very attractive, clean devices and have spent thousands of dollars in national advertising, coupled with the distribution of every kind of literature possible for the education of the central station solicitors. They have produced moving pictures showing the manufacture and actual uses of heating devices. They have gone to the central station and have offered the free use of these machines that they might assist the central station in teaching the employee the use of these devices in order that they may be able in some small measure to tell the public when they come in to buy, something about the apparatus. I really think that the manufacturers have done all that they should be asked to do for the central station in regard to electrical appliances. It has been admitted this evening that central stations are allowing their windows to become dusty, dirty and unattractive. This certainly shows a very small amount of appreciation on the part of the central station for what the manufacturer has done for them. I think you will agree that the manufacturer has done his part for the central station. Now what has the central station done for itself to increase the sale of appliances? Certainly very little by allowing their windows to become an eyesore to passers-by. If you are not going to have a window display, you might as well get out of the heating device business. Keep your windows always on the job, presenting new selling arguments each week. It is your best salesman if well treated. I would not think of allowing a window to go without a change for over a week. If you put in a window and you notice that it does not attract attention the first two or three days, change it. Have two or three windows that week until you get something that will attract attention.

I feel that the manufacturers have been thwarted somewhat in their efforts to place their product in the hands of the ultimate consumer inasmuch as the average central station does not have "honest to goodness" salesmen. They may have someone on the floor to wrap up the article, take the money, and someone to make a house to house canvass, to take orders from those who do want to buy, but these individuals do not create sales. Unless a man does know something about appliances, unless he is enthusiastic and thinks his product is what people ought to have. he certainly is not going to the door of a prospective customer and make very much of an impression. The central station must have salesmen instead of dummies and order takers before it can complain about the sale of appliances. I believe that any trouble of the central station in relation to the sale of appliances to its customers is absolutely the fault of the central station in lack of attention to its windows and in not getting salesmen, or after getting them, for not teaching them something about appliances so that they can impress the customer that what they have to sell is worth the price asked.

Mr. Stetson. No reply necessary.

The President. Any further discussion on this paper, gentlemen?

Mr. Burleigh. Gentlemen, I had not intended to say anything in connection with this paper, but as Mr. Addis did not succeed in starting anything I would like to see if I can't start something.

I would like to inquire why it is that the central stations pay so much attention to endeavoring to maintain neutrality. It disgusts me. If a concern has got the best goods and can do the best job for a central station, that is the concern for the central station to deal with. There is nothing to patting a fellow on the back and trying to keep the good-will of the fellow to whom you ought not to give an order. It will get to you sooner or later. I wish you would think over this neutrality business; there is nothing in it.

Now, then, these current consuming devices, I think it is a rank mistake, and has been for years, for the central station to talk about current consuming devices. Consumption of current, the minute it is spoken of to the layman or to the prospective customer, means dollars out of his pocket. That is the poorest way in the world to attempt to get business. Think up some other name; call them current utilizing devices, or anything but current consuming devices. I want to leave that as a gem of thought for the central station people to think over, and let them all stop talking about current consuming devices. The fact that they do talk of current consuming devices is absolute evidence of the fact that they should not. This phrase was coined by the manufacturers in presenting their goods to the central station and served its purpose with them as their business is to promote the use of any device that will consume current, but the fact that this phrase appeals to them is reason enough for their not using it in their dealings with the party who is looking for results and realizes that current consumption is incident to the results. Further than this, as it is evident that the central station interests are the manufacturer's interests, let us as manufacturers sacrifice our own interests in this regard for the benefit of our customers and adopt the phrase "current utilizing devices," or "electrical conveniences," or "electrical devices," or "electrical commodities."

Now, then, in connection with Mr. Addis' talk with a lady on buying flat irons. I don't agree with Mr. Addis for a minute. We will say that we have three flat irons on the counter, and one flat iron salesman, and a lady comes in to inquire about flat irons. Just why did the lady come to Mr. Addis to inquire about flat irons? Because she thought Mr. Addis knew more about flat irons that anybody else, and she, knowing nothing about the subject, wanted information. She asked Mr. Addis about the flat irons, and he said, "There are three flat irons; they are all good. You can take your pick." The lady takes up a flat iron, and this one doesn't hang right for her. She takes up the next one and it feels kind of good to her and she asks Mr. Addis, "What are the characteristics of that flat iron? That seems to be a pretty good flat iron." Mr. Addis then has an opportunity to bend his energy to explaining the good points of that flat iron. She has forgotten the flat iron that did not hang right, and he cannot cause any hard feeling with the manufacturer if he enlarges on the good points of that flat iron instead of the others; he has got her started and it is a cinch to sell it to her. That is my opinion of selling a flatiron to an uninformed customer, even if all flat irons were alike.

The President. I am sorry that there is one phase of Mr. Stetson's paper that has not been discussed more fully, and that is the last part of the paper, under the subject "Service."

I think that we should all consider carefully that section of the paper. It must be realized that when a company sells appliances, there is something more to follow, and that is the supplying of the service for the utilization of the appliances. Many companies put out a lot of appliances each year, but they do not go out among their customers six months or a year hence and definitely ascertain if the appliances are doing the work intended, and are satisfactory.

In my experience, we have found it necessary to follow up very closely the appliance end of our business. Invariably, we find appliances laid away, due to some slight defect, principally due to a defect in a cord or plug. Many people will neglect notifying the company when an appliance is defective, and after a while the appliance is laid away, with the feeling that it is not worth while bothering with. There is no question in my mind but what appliances that have been laid on the shelf, due to some minor defect, and the feeling on the part of the customer that they were not worth bothering with, have hurt the sale of other appliances a great deal more than realized.

I believe that if central stations sell appliances, or are anxious to increase the number of appliances on their lines, they have got to care for them and inspect them periodically so as to keep them in proper working condition. It should not only make inspections and keep in working condition the appliances they sell, but the appliances that are sold by the contractors as well, or in other words they should inspect frequently, and keep in operation to a reasonable extent, all appliances connected to their lines.

Mr. Ingalls. Mr. President, it is my impression that a great many gas companies make a practice of occasionally having an appliance man call on every customer to see that their gas apparatus is in perfect working order. If there are any little things wrong the apparatus is fixed up and the customer is satisfied. It seems to me that the electric appliance game has reached a stage where it would be possible for central stations to adopt a similar policy with regard to the electric appliances, for instance a yearly visit. I may be mistaken about the operation of the gas companies, but I am quite sure I have seen some adopt that as a regular plan.

The President. In answer to Mr. Ingalls question, I can say that at Woonsocket we are operating a combination Gas and Electric Company.

In our gas department we have what we term "Gas Maintenance Men." These men inspect frequently, and at regular intervals, arc lamps, flat irons, gasteam radiators, non-automatic and automatic water heaters, gas stoves, gas heaters, and other miscellaneous appliances.

On automatic water heaters, we inspect the heater, clean the coils, and adjust the burners, every four (4) months.

Every gas stove customer is visited in the spring of each year. The burners are all gone over and adjusted, and the lady of the house is asked if she is entirely satisfied with the operation of her stove. Many times we find that there is some particular kind of food that she thinks does not bake properly. A lady demonstrator is then sent to this place, and if agreeable to the lady of the house the demonstrator remains and shows her how to regulate the burners in order to bake the particular kind of food, and in many cases, makes an actual demonstration. Our policy is to anticipate complaints, if possible.

Our inspection department find a great many times that appliances need just a simple adjustment to work satisfactorily.

The customer in many cases neglects or hesitates to make known his wants to the company, and keeps putting it off until the apparatus refuses to work altogether, and then calls us up. We prefer, if possible, to make the simple adjustment, keeping the apparatus working, and save the non-operation of the appliance later on.

We have not followed up the matter of inspection in our electric department as closely as we have in our gas department. We are, however, planning on putting out an electrical maintenance man, and follow along the same general lines as in our gas department. We have, however, for some few years, made regular inspection of customers' motors for clearances, oil, etc. Also if the motors are not kept as clean as they shou'd be, the matter is taken up with the proper authorities, so that they can be taken care of. We believe that our motor inspection, has in many cases, saved a shut down, and consequent loss of revenue.

Is there any further business?

Mr. Gibbs. Mr. President: We have had quite a talk this morning about "the little fellow and his problems." It seems to me there is a tendency on the part of men of the small central stations, men doing small business, to think that this problem is getting above them and beyond their reach, as indicated in the possibility of their not being able to have display windows, etc.; but there are a lot of other ways in which the small place, and the smaller the place the more practical these points are, can do the work.

In the first place, I don't believe there should be a person employed by an electric lighting company who does not have electricity in his house, whether he owns it or not. It ought to be put in through the assistance of the central station organization. The smaller the station, the fewer the employees, the more practical this point is. If you have got linemen, men in your stations, bookkeepers, if you have not got more than half a dozen men in your whole equipment, on your whole payroll, every one of them ought to be using current. They ought to live in houses lighted with electricity. They ought to be gotten together every once in a while and talked to by the manager or by someone of importance who happens to come along, and told about the latest things, and some of those things brought on at cost. If you can't do it for all of them, bring on two or three of the things and have them used around in your employees' families.

The busier a man gets and the more income he begins to acquire the more inclined he is to separate his family, his wife and his daughters, from his business. It seems to be a notion in people's minds that they acquire "ton"—I believe they call it—by keeping their families out of their business, but believe me, you can put your advertising appropriation in the bank, or buy clothes with it for your wife and your daughters, if you have got them working for you. Your daughter goes to school down in the grammar grades. Her value to your business increases as she grows older and goes along up through the high school and begins to have little afternoon teas and parties, and gets her class friends to come. You think right away about putting your boy to work, and if you are not getting anything in the way of income you put him to work for yourself. If you are just about halfway between, you say, "Oh, I don't want him in this business," and you try to push him into something else as soon as you can. If you are getting a good salary, why, you think, "This is the business for my boy," and you want him in it if he likes it at all. But you don't think anything about the folks at home. If your wife is helping you with your business she is passing along a good word about appliances you are using in your home; your daughter is talking about these things at home, and when the problems of physics, domestic science, etc., come up in school she can talk about those things and know them from what you have told her. When your wife tells you in the morning that she is going to call on such and such ladies in the afternoon, you run over your file and then call her up and say, "Mary, did you say you were going over to Mrs. Smith's this afternoon?" "Yes." "Well, they have got a percolator and a toaster over there. I wish you would ask while you are over there how those things are going, if they like them, and see if they are working all right."

You will find business right along on that plan that will surprise you. The man, the little fellow I will call him—because we have talked that way and we all know what it means because we all try to work together—the little fellow gets a notion that he has got to work like thunder himself at manual labor to make his plant go, and that the more detail in the office and on the road and up on top of the pole and in the station he can do himself the more he is saving money, but he is costing himself and his company money all the time. You don't have to think about advertising as a big proposition, something that takes a lot of money and a lot of hot air and all that sort of thing, which you have not got. It doesn't. It is just the simplest kind of living every day. If you take your problem of the sale of appliances and the troubles with your customers, home to your family, and let them go out with you and help settle them, and just treat this problem of business as ordinary, simple, decent living on an economical basis, you can't help but make it grow, and then you will wonder how it happened because it is so simple.

The President. Gentlemen, I dislike to close this discussion, but the hour is getting late and we have one other paper. The next paper is entitled "The Value of the Electric Vehicle to the Central Station," by W. H. Snow and David W. Beaman, New Bedford Gas & Edison Light Company, New Bedford, Mass.

THE VALUE OF THE ELECTRIC VEHICLE TO THE CENTRAL STATION.

By W. H. Snow and David W. Beaman,

New Bedford Gas and Edison Light Co., New Bedford, Mass.

The electric vehicle industry has already begun to assume such proportions, from the standpoint of both the manufacturer and central station, that it demands the special attention of these interests to insure its further development. The electric vehicle manufacturer is naturally the one most interested in the immediate adoption of this means of transportation, as its business prosperity depends entirely upon the successful marketing of its single class of product, whereas, the central station is not dependent on any one form of energy consuming device for its income. This partially accounts for the fact that the electric vehicle has been completely ignored by the central station as a whole, up to a comparatively short time ago, and by a majority of these at the present time.

Considering, however, the particularly profitable character of business offered by the electric vehicle, it becomes the duty of the central station to realize its responsibilities and enter actively into the promotion of this most attractive branch of its service. It will, therefore, become the function of this paper to present the electric motor car in its true light so that the electric supply companies will adopt it with enthusiasm and recommend it to their customers for their own use. In defense of the central station and its former negative attitude, it must be admitted that the earlier types of vehicles and batteries were not of a character to warrant enthusiastic co-operation, but remarkable developments have taken place along these lines during the last few years, and it is our purpose to prove by actual cases and personal testimonials of users, that the electric of today is no longer an experiment, but that it is filling a long-felt need and is worthy of the intelligent consideration of the electrical fraternity. The central station, which has not made a study of the problem, naturally asks the question, "Of what value is the electric vehicle to us?" and to such an inquiry we answer from actual experience. The passenger electric is operated intermittently during the day, and to some extent, during the evening, while the commercial wagon is used during the working hours of each day, consequently, recharging of the batteries naturally takes place during the night after the power load has been discontinued and the lighting curve has begun to flatten out. This means that generating apparatus and transmission copper can be made to return dividends at times when otherwise they would remain idle, and the only expense necessary is that required for extra service. Thus the electric vehicle provides a greater per cent. of income with a comparatively negligible expense. A passenger electric will average to use from one hundred to two hundred kilowatt hours per month, and a one-ton commercial vehicle of an average equipment will consume approximately four hundred kilowatt hours per month. Multiply these figures by the number of electrics you might reasonably expect to be operated in your territory, then figure out your annual income at the rate per kilowatt hour you could afford to make for this character of business. Compare this amount with the income received from other sources at the same expenditure of time and money and you will be convinced how you can best serve your stockholders. For years, the central station spent most of its time developing its lighting load, then its attention was turned to introducing electric power, and finally, during the last few years a great deal of effort has been exerted stimulating the use of electric signs and electric cooking and heating apparatus.

All of these current consuming devices are used during a comparatively small number of hours during the day and early evening, while throughout the remaining hours of the twenty-four, a large per cent. of the investment remains unproductive. Mazda lamps are increasing in efficiency, the power load has become fairly well established, while the miscellaneous apparatus above referred to consumes power in comparatively small amounts at a net profit less than is enjoyed in other branches of the business.

At this crisis in the industry when the electric supply company is looking about for some means of increasing its output, the modern electric vehicle offers itself as a solution to the central station problem. It is easy to figure the amount of income received from the charging of an electric as compared with that received from other classes of apparatus connected to the system, and in the light of this comparison one should be convinced how much more he can afford to expend in promoting this department than would be justified in less remunerative ways. It is interesting to note the extent to which electric vehicles are being used in various sections of the country and the rate at which they have increased during the last year. The following figures, which must be considered as approximate, as they are being changed from time to time, will show the number of machines in use in some of the larger cities in New England, and also those used throughout the country, together with the per cent. increase where it can be determined:

Pawtucket, R. I.,	5	passenger	7	commercial	increase	50%
New Bedford, Mass.,	14	"	11	"	"	100%
Springfield, Mass.,	25	"	50	"	"	100%
Hartford, Conn.,	250	"	45	"	"	75%
Lowell, Mass.	7	"	15	"	"	12%
Worcester, Mass.,	11	"	34	"	"	100%
Providence, R. I.,	28	"	30	"	"	43%
Greater Boston,	282	"	261	"	"	42%
Salem, Mass.,	19	"	3	"	"	33⅓%
New York City.	498	"	1700	"	total	2198
Chicago,	2200	"	630	"	"	2830
Washington, D.C.	654	"	255	"	"	909
Denver, Colorado,	850	"	37	"	"	887

In the last few cities it is impossible to tell what per cent. of these totals have increased during the last year, although we have every reason to believe that it is a considerable per cent. In the New England States the following number of registrations were recorded up to the last of August:

Maine,	8	passenger	4	commercial	total	12
New Hampshire,	28	"	16	"	"	44
Vermont,	6	"	3	"	"	9
Massachusetts,	562	"	385	"	"	947
Rhode Island,	28	"	42	"	"	70
Connecticut,	335	"	133	"	"	468

This makes the totals in all New England of 967 passenger and 583 commercial, a total of 1550, so by referring to the above figures, it will be noted that there are more vehicles in each of the cities New York and Chicago than there are in the whole of New England. In order that it may be understood a little more clearly how electrics are received by their owners and users, we are abstracting from certain letters which have been received by the Electric Vehicle Association of America and by various agents both in New England and elsewhere. In cases where the name of the car was used this has been omitted and also any further information which does not deal directly with the subject in hand, as we are endeavoring to treat the matter broadly and are discussing electrics in general, rather than any particular makes or types.

A manufacturing company in one of the mill towns of northern Massachusetts writes as follows:

> "We have had two electric trucks in use for upwards of two years, and while we have had to make repairs more or less, in the main, they have given good satisfaction. We find they handle the work much better and quicker than horses possibly could, which allows us to take care of a great volume of work, which we could not possibly do under our old system of horses."

Another manufacturer in Pawtucket, Rhode Island, writes as follows:

"We have had two electric 2-ton trucks in service for some time, one coming into service in July, 1912, and the other in April, of this year. We have found them dependable at all times, and the maintenance charges are very low. Number one was taken out of service for three days after running 5,200 miles and new bushings were put in steering post, two segments replaced in the controller and the battery solution renewed.

The total maintenance charges on this machine did not exceed $100 up to the present time, including tires. The second machine has not yet needed repairs. We charge nights and boost at noon and average about twenty miles a day for each truck. Before buying trucks we had six horses and now our stable is for sale, lease or to let, for we have a new garage across the street. We have also two electric passenger cars in service. We have found that electric vehicles fill the bill in fine shape for us and we will help 'boost' the electric."

An electric light company writes as follows:

"Our electric machine is used in the day time by the Construction foreman, who averages close to 700 miles in a month, and at night by our night patrolman, who at this season of the year averages very close to 1,000 miles a month. It is put on charge at about eleven o'clock every night and left on until full; it is taken out by the Construction foreman at 8.30 in the morning and run until noon, when it is put on again for about on hour, then at five o'clock it is put on charge until about 7.30 P. M., when the night patrolman takes it out.

"We have been giving this car a lot of work to do, to see how it would stand up under unusual conditions, and so far we have been very much pleased with its performance. We hope to be able to purchase another some time next year for the use of our Construction foreman only, so that the present car can be kept for the use of the night patrolman."

We quote from a teaming concern in Hartford, Connecticut, which writes as follows:

> "We have used a one-ton electric commercial car since June 10, 1912, and up to June 10, 1913, one year; it had run 10,501 miles and earned $2,650.17. We use this car in connection with about fifty horses in a general teaming business using this for the long, hard runs with a view to saving the horses rather than showing large returns. In all large teaming businesses, there is an ever-increasing number of long and longer deliveries which go in with the short distance deliveries and all pay the same price for delivery, so by taking out these long runs which are done at a loss, and giving the horses short runs, which pay well, it is rather unfair to the power wagon, but with this handicap it has earned us 30% profit above all known or estimated expense, including depreciation, average up-keep, insurance, liability, interest, taxes, tires, etc., etc. Before we had this power wagon we used three horses to two wagons, one horse resting. Since we have had this power wagon the third horse is working, and the horses do not get the long runs and are in better condition than before we had the 'horse saver.' Now you ask me what I think of it. What would any business man think of an advance that would pay him 30% net, and would pay that on work that was done at a loss with the horses?
>
> How do they compare with gasoline trucks? They are simpler to handle and there is no engine to wear out. Strong advocates of gasoline trucks are replacing them with electrics for local deliveries of fifteen miles or under from home. We feel confident that in a short time battery stations will be located in all the principal cities and an electric car can go anywhere its owner cares to send it by exchanging batteries at any station. It is perfectly feasible and is coming."

A large meat packing establishment in Chicago, Illinois, writes:

> "A 3½-ton electric truck went into commission on November 30, 1910, and had covered 9,421 miles up to November 30, 1911. During this period the truck has been in service every working day making deliveries of meat to down-town points in Chicago, and to such suburban points as Oak Park, Kensington and Dunning. The average load carried has approximated the rated capacity of the truck. During the very hot weather this truck was performing the work of three teams, covering anywhere from 45 to 55 miles per day. The driver states that he had no difficulty at all in making 45 miles and picks out the following figures, namely, 49, 50.1, 52.4, 55 and 59 respectively as proved."

One expense which they were put to during this interval was the renewal of tires, and the replacing of the Morse chains after approximately 7000 miles of service. A hat manufacturer in Philadelphia, Pennsylvania, writes as follows:

> "We beg to say that not only has our electric truck given us good satisfaction, but we do find that in the five years that we have had it, it has been subjected to very severe tests, all of which it has stood exceedingly well, and while, of course, there have been minor repairs made from time to time, these have been very small in amount and it gives us great pleasure indeed to recommend the electric truck to the use of the public."

A large electric manufacturer in New York writes as follows:

> "We desire to express our complete satisfaction with the 2-ton electric truck which we purchased about a year ago and which is showing a remarkable saving in our cost of transportation. We have at hand a memoranda of the last 280 days of operation, which shows the following:

Truck carried	1,483,375 pounds
Average pounds per day	5,297 3-4 pounds
Distance travelled	8,605 miles
Average miles per day	30 6-7 miles

> Our trucking system shows that this was done at a cost of $833.08 less than we are able to do with our horse-drawn equipment, which is a remarkable demonstration of the 'economical and working capacity of the electric vehicle.' We might add that this truck has more than met our expectation in points of economy and reliability."

The following was received from a hardware manufacturing company of Pittsburgh, Pennsylvania:

> "We still have in daily use the 5-ton electric truck bought seven years ago, and it is giving us the same satisfaction it has given us during its entire service. While the truck has had what we consider a long life, it is today in excellent condition and seems good for many years to come."

A trust company in Cleveland, Ohio, writes as follows:

> "It would seem that there is nothing better we can say than to recall the fact that we purchased our second machine after some six or seven years' experience with the old truck."

The following was written by the president of a machine company in Boston, Mass.:

> "We will turn the letter of inquiry over to our general management department for attention as I know nothing about the details you call for except that our vehicle seems to be still running about the streets at all hours and times and in all kinds of weather, much to my surprise."

A furniture company in Kansas City, Missouri, writes as follows:

> "We take pleasure in sending you herewith our order for another 2-ton electric truck to be delivered as soon as possible. Our electric vehicle equipment is steadily increasing, this being the third machine we have purchased. We find electric delivery service efficient and economical and expect to do away with our entire horse equipment in the near future."

The following from a railroad transportation company in New York:

> "Regarding the experience which we have had with the electric which was built for us nine years ago, would say that it has been very satisfactory and there has been no time that we would have changed back to the horse vehicle, for economical or any other reasons. Of course, at that time the art of building cars and batteries was not so well understood as now, and there are some things about our old car which we would like to have a little different, but we are satisfied, barring little things which have since been corrected, and we have used the car every day for nine years. I hope to send on order very soon for one of the latest models."

A light and heavy teaming concern in Methuen, Mass., has sent the following letter:

> "In regard to our 3½-ton truck which we purchased six months ago, will say that it has proven satisfactory. The truck has drawn the greater part of our supply ice from ice houses to the delivery wagons, which is a round trip of five miles. The truck has also drawn the greater part of our ice from the houses to the yard for the loading of the teams and for the start the next morning. One man has been employed to load and operate the same, the machine being the most simple thing to operate. In years past, we have had two 2-horse teams to draw our supply ice to the delivery carts, our teams being

obliged to go to the ice houses for their ice for the next day, a distance of two miles, and return making another distance of two miles, loaded. So far as the actual difference in figures is concerned, we are not able to state as we have not figured them, but can easily say the truck has a great advantage over horses and we recommend them for use."

A transfer company in New York writes as follows:

"We beg to state that the entire cost in connection with the 3½-ton electric truck purchased by us over sixteen months ago, for the last year of that time was $3,353.84. This covers insurance, repairs, new tires, new batteries, and wages. I might add for your information, that in putting this truck in service, we put out of service two double wagons, the cost of which for the same period, would have been $4,694.60, or a saving in favor of the truck of $1,340.76."

A dealer in meats and lard in Cedar Rapids, Iowa, furnishes the following:

"We are very glad to be able to advise you that during the eighteen months in which we have had in operation two electric trucks, a one-ton and a five-ton vehicle, we have been entirely satisfied with the results which we have obtained from their use. Outside of renewals of various batteries and parts, we have had no expense whatever in connection with these trucks.

"The conditions under which we have been operating these trucks are peculiar to our own business and on this account we do not believe that the figures showing cost of maintenance and operation, would be of any service to you. We are, therefore, not sending these figures."

A baking concern in New York City, in ordering a new 1000-pound car, writes as follows:

"Please deliver as soon as possible our new 1,000 pound car as we are tearing down our stable and need it very badly. It is now a year since we first started using electrics and they have proved so satisfactory that we are doing all our delivering with them. By the way, it was the splendid performance of the first 750 pound electric wagon we bought, which convinced us of the value of the electric. Our total operating cost for this wagon for the first twelve months was only $164.91. Now, as you know, we will soon have no horses whatever, but all electrics in our delivery service."

A firm of commission merchants in Cincinnati, Ohio, writes as follows:

"Eight years ago we purchased an electric truck which has been constantly in use in our business and is now doing excellent service. It is with great pleasure that we hand you this letter recommending the truck. We are sure that with the new and up-to-date improvements that have been instituted since this truck was made, intending purchasers will have even better service than we have had and are now getting from this one."

A railway and steamship line in New York City writes as follows:

"We beg to say that the fact that we used for nine years one of the first cars made, and practically every day in each year, in all kinds of weather, then ordered another one, is the best evidence we can furnish that we are not only pleased with the vehicle, but with our treatment by the electric dealers. We could not, and would not go back to the horse vehicle under any circumstances. If the new cars are as good as we think they are, and as is claimed for them, we will be very pleased when we receive the new machine."

The Central Station in West Chester, Pennsylvania, writes:

"Our vehicle has been with us a very short time, but we have had no trouble with it whatever. It has hauled some very heavy loads, and find it able to climb the worst

> hills in our vicinity. Thus far we have nothing but praise for the machine."

The central station in Hartford, Connecticut, states that the Hartford Electric Light Company has been using electric vehicles for more than twelve years and getting satisfactory results in all this time. In fact, some of the original vehicles are still in service. The up-keep of the electrics were found by actual trials of other types to be far the least and the service more reliable. They take pleasure in saying that the cars are in frequent use and are giving better results than they were led to expect. There have also been received a number of testimonial letters from various central stations throughout the country, but we are assuming that statements from the users, not interested in the industry means more than those from the people who are receiving a benefit from their sale.

A dealer in millinery in New York writes:

> "We are very pleased to inform you that the service rendered by the various electric vehicles we have purchased has been very satisfactory, and the expense of batteries has been very nominal. Should we at any time increase the number of our vehicles, we have no doubt that they will be electrics."

A gentleman from San Francisco writes as follows, regarding the electric pleasure vehicle:

> "I take this opportunity of expressing my entire satisfaction with the workings, mileage and general behavior of the electric victoria which I purchased some time ago. Will state that the up-keep is surprisingly low for the mileage obtained in climbing the steep hills in and about San Francisco. For instance, one hill had a 24½% grade which my electric climbed with ease. I have no hesitancy in recommending an electric car for anyone desiring a first-class vehicle."

A dealer in butter and eggs in Washington, D. C., writes as follows:

> "We are glad to say that the 1,500 pound delivery wagon which we purchased is giving even greater satisfaction than we anticipated. We find the speed and mileage to be in excess of the guaranty, and from what we have been able to learn we believe it is the most economical car for cost of charging current in the city."

Electric trucks seem specially adapted to the brewery trade, and we are quoting from a number of letters from brewers throughout the country. One from New York City writes:

> "It is with a genuine sense of satisfaction that we enclose you our check in payment of two electric trucks and charging equipment, the arrival of which at our brewery, at the beginning of the torrid wave when hundreds of horses were dropping in our streets from heat and prostration was almost providential. Moreover, the speed, promptitude and efficacy in our deliveries are such revelations that we have frequently chided ourselves because of our laxity in not utilizing them earlier, and unless our exuberance over these trucks thus expressed proves fallacious, we shall shortly dispense with horses as fast as time will permit."

Another from Cincinnati, Ohio:

> "We still have in daily use the two 5-ton electric trucks purchased in 1904. Besides these, we have one 3,000 pound wagon bought in 1905, two each of 2-ton capacity about the same age and a lighter wagon purchased in 1907. While we are confident that modern trucks and wagons must be more efficient and economical than those of the vintage we have, we wish to express our complete satisfaction."

Another from New York City:

> "We hereby place an additional order for six 5-ton beer trucks and twelve 3½-ton carrying capacity bottled

beer trucks. This order is given on account of the splendid results obtained both as to service and economy over horse hauling, by the use of six 5-ton trucks built for us fifteen months ago."

One from Dubuque, Iowa:

"We beg to say that eight years ago we installed a 1-ton double wagon and two 5-ton keg trucks which we are still using. The 1-ton truck has been practically in constant service since its installation, and the 5-ton trucks have been operated most of the time with the exception of some portions of the winter when we used our horses rather than let them stand idle in our stables. We have one trip which is made practically daily with the 1-ton truck, carrying a full load, which consists of a seven mile run and a climb of a 15% grade, which is made without any trouble whatever. We start the larger truck on a 20% grade with ease. Our cost of maintenance has not been excessive and we figure that we are doing the work at less expense than can be done with horses. We are charging off these cars at 8% per annum, although we have no particular reason for using that figure as the cars have paid for themselves at this date. We believe that with ordinary care and attention the cars will last at least five years more, and aside from a slight difference in construction we consider them as good as new cars of the present type."

One from Newport, Kentucky:

"We have had six 5-ton electric trucks in use during the last six or seven years. We operate them between our plant and railroad yards, about one mile distant. We have a splendid level road, in consequence of which our batteries are giving us excellent service, and our rubber tire trouble is small. In our case the trucks are doing excellent work in every way. These trucks have displaced at least thirty horses and probably twelve drivers, and as above stated, in our case the electric trucks are a great success."

One from La Crosse, Wisconsin:

"Our 2-ton electric truck was put into service eight years ago and for the first five years we kept no record. We find, upon investigation, that our record on this machine from March 1, 1910, to October 2, 1912, shows an up-keep expense of $631.40. These figures cover tires, batteries and replacements as well as labor incident to making these repairs. During this period the truck has covered a distance of 11,840 miles. A 3½-ton truck furnished us in March, 1912, has covered a mileage of 2,360 miles at an expense of $45.00. The above figures do not include current. In our experience the electric truck has proved more satisfactory and economical than a gasoline truck for city deliveries."

A beer concern in Philadelphia, Pennsylvania, writes:

"In regard to our experience with electric delivery vehicles, would say that we purchased the first one in November, 1903, since which time we have kept adding to our outfit until today we have twenty-three. Our early results from these trucks were rather discouraging on account of the high cost of up-keep occasioned by the necessity of frequent renewals of batteries and tires. This expense was our chief criticism against them as otherwise they were splendidly adapted to our line of business, giving us facility for rapid and frequent delivery. As improvements in batteries and tires rapidly developed, our up-keep expense decreased until today we rely very greatly on our trucks to deliver our product, and only keep about half the number of horses we formerly did to help out when rushed. The average life of a battery of today is two or three times as long as those made seven years ago, and the same can be said of tires. Add to this the refinements introduced in the construction of electrics and improved motors and you have a logical explanation of why they are better for delivery purposes than horses. We are looking forward to the early delivery of the four trucks recently ordered in order that we can make further tests as to efficiency and economy of operation."

A machinery manufacturing concern in Plainfield, New Jersey, writes:

"We beg to advise that we have not had our 5-ton electric truck in service long enough to make any statements further than that the truck is giving us excellent service, and we believe at a figure considerably less than a gasoline truck would do, particularly in getting in and out of close places. Our driver is getting so that he handles the truck traveling backwards almost as well as forward, and does both almost as easily and promptly as the average man would handle a wheelbarrow. We believe that the whole key to absolute success is having a proper knowledge of the care of batteries, and know just what to expect of it in the way of mileage, for all kinds of weather conditions."

A flour mill in Grand Rapids, Michigan, sends the following:

"Five years ago we purchased a 5-ton electric vehicle which was a success from the start. Two years ago we were offered a second-hand 2-ton truck and we were so well pleased with the operation of the 5-ton that we purchased this 2-ton truck and we are pleased to state for your information that this second-hand truck has been more than we anticipated and hoped for. Both trucks are in daily use and show us a considerable saving in our cartage. Our expense and maintenance of the truck has been very low. We are contemplating at the present time the purchasing of a third truck to be delivered some time in the early spring."

A trucking concern in Detroit, Michigan, writes as follows:

"It will probably interest you to know that the 5-ton electric truck which went into regular service covered a total of 2,525 miles in less than two months. The largest individual day's work was yesterday when the truck made a total of 60 miles and hauled fifty tons of coal, making five trips, with one battery, and five trips with another installed during the noon hour. This truck has not as yet been out of commission, and it has averaged about fifty miles per day for every working day in use."

A vermicelli factory in Brooklyn, New York, states as follows:

"Your letter of November 29th was received by us in a very opportune time because yesterday, December 6th, 1910, we had a very severe snow storm, snowing and drifting all day long. Our electric truck made three trips carrying vermicelli, 6,000 pounds each time, two in Brooklyn and one in New York, and arrived back home 'with snow up to her hubs' where it had drifted in, in the rear of our garage before six in the evening, and today it is out in the snow delivering all goods as usual. We do not consider ourselves capable of estimating how many horses or drivers it would take to do this work on a snowy day, but we must say we were more than pleased with our electric truck."

A furniture dealer in Kansas City, Missouri, writes:

"We take pleasure in handing you herewith our order for another electric 2-ton truck, a duplicate of the one ordered by us last year. We are making from twenty-six to thirty miles a day over the hills of our city with the truck, replacing five horses. This order for a second machine is in consequence of the work done and our belief in the economy of the electric method of handling."

A shoe manufacture of Boston, Massachusetts, writes as follows:

"Our experience with a 3-ton electric truck has firmly convinced us of the economy of that means of transportation. With our factories producing over 15,000 pairs of shoes daily, service demand of the truck has been extremely hard, yet in every respect it has proved itself more capable than your claims had led us to expect. The best evidence of our satisfaction is the order which we have just placed for a 5-ton truck."

A cotton manufacturing company in Port Chester, New York, writes as follows:

> "We have operated a 5-ton electric truck for the past five years. The work required is the transportation of cases of cotton goods weighing 800 to 1000 pounds each. We figure on carrying five tons to the load. During this period the truck has been in use every day except when being painted. We figure that it would require at least three teams of horses to do the work of the truck; on this basis we consider it much more economical. Regarding the battery cost, we have used one set of batteries for three years, assembling our own. We cannot make a stronger statement than to say that under no circumstances would we return to the use of horses for trucking purposes."

A novelty manufacturing company of Philadelphia, Pennsylvania, writes that they have used two electric trucks continually for three years and they are giving entire satisfaction. They say they would under no circumstances go back to horses again.

The following is a list of some of the electric fleets now operating in New England:

Edison Electric Illuminating Co. of Boston	76
American Express Company of Boston	34
Ward Baking Company, Cambridge, Mass.	33
General Electric Company, Lynn, Mass.	25
Adams Express Company, Bridgeport, Conn. . . .	21
National Express Company of Boston	13
W. W. Walker Company, Hartford, Conn.	12
New Bedford Gas & Edison Light Co., New Bedford, Mass.	10
United Electric Light Company, Springfield, Mass. . .	9

Friend Bros., Lowell, Mass.	8
Hartford Electric Light Co., Hartford, Conn.	8
J. E. Cousens Coal Co., Boston, Mass.	7
Metropolitan Coal Company, Boston, Mass.	7
Pacific Mills, Lawrence, Mass.	7
Pureoxia Company, Boston, Mass.	7
United Illuminating Company, New Haven, Conn.	7
Home Brewing Co., Bridgeport, Conn.	6
Worcester Electric Light Co., Worcester, Mass.	6
Boston Rubber Shoe Company, Malden, Mass.	5
Geo. W. Gale Lumber Co., Cambridge, Mass.	5
Houghton & Dutton Co., Boston, Mass.	5
Malden Electric Light Co., Malden, Mass.	5
Winchester Repeating Arms Co., New Haven, Conn.	5

Making a total of 321
vehicles used by twenty-three firms.

Some of the largest installations of electrics in the country are as follows:

Adams Express Co.	250
American Express Co.	106
Coes & Martin Co.	100
Gimbel Bros.	96
New York Edison Co.	95
Ward-Corby Co.	64
Rochester Railway Lighting Co.	52
Ward Baking Co.	200
General Electric Co.	44
Edison Electric Illuminating Co. of Boston	76
George Ehret Co.	42
R. H. Macy & Co.	39
Commonwealth Edison Co.	29
Motor Delivery Co.	26
Peter Doelger Co.	62
H. C. Piercy Co.	43
Jacob Ruppert Co.	112

James A. Hearn & Son	35
Annheuser-Busch Co.	57

The United States government has also in use upward of seventy-five electric trucks. In the light of the above figures and personal testimonial letters together with the amount of business which this means to the central station, it does not seem that it ought to be necessary to urge our various companies to exert a little energy in this direction.

In the foregoing we have quoted from the experiences of a large number of concerns, many of whom have had larger and more varied experience with the electric vehicle than has our company. Our experience corroborates the facts and figures given.

We purchased our first electric about four years ago for the use of our Construction Department. Before we had had it a week, a very heavy deep snow fell and with it the usual overhead line troubles came. Here was the opportunity to test the 1-ton electric. The test was entirely satisfactory, for the auto plowed the drifts and traveled many miles, taking care of the trouble calls in a way that would have been impossible with horses. The next three trucks followed in quick succession and are about three years old. Then in the past year came two runabouts and three more trucks. These are all working every day and giving good service, accomplishing the work quicker and more satisfactory than horses could do it. The accompanying table shows the record of these autos in the last six months:

	Capacity	K.W.H.	Miles.	KWH per mile.	Miles per day.
No. 1	2000 lbs.	2164	2749	.79	18.3
No. 2	1000 lbs	2680	2228	1.20	14.8
No. 3	1000 lbs.	2280	3480	.66	23.2
No. 4	7000 lbs.	3600	1876	1.93	12.5
No. 6	Runabout	1842	4775	.39	31.8
No. 7	1000 lbs.	1850	3747	.49	25.0
No. 8	Roadster	1638	2434	.67	16.2
No. 9	1000 lbs.	2915	3521	.83	23.5
No. 10	4000 lbs.	1880	1871	1.00	12.5

We are convinced by our own experience as well as by the experiences of others, as shown by the above testimonials, that the electric truck and electric runabout are of great value, not only to the central station but to the customer who uses them. To emphasize our conviction we might state that our company is building a garage in the center of the city adjoining our new office building, to try to encourage the use of electric vehicles by furnishing a place for storage where they can be charged and be taken care of in an intelligent manner. The garage is 65 feet by 100 feet and will house perhaps thirty electrics including our own.

There seems to be no good reason why every central station should not put in use at least one electric and keep a data from this which it can use in urging its customers to adopt this economical transportation device. The future of the electric is very bright and the belief is growing stronger that when the electric vehicle is properly understood and scientifically applied, it will solve a great many of the transportation problems which are now worrying our merchants and manufacturers. The electric vehicle, as a current consuming device should be of great interest to members of the National Electric Light Association, and there should be nothing but harmony and co-operation between its members and representatives of the electric vehicle interests.

Science has entered the motor truck against the quadruped, and just as the electric light has supplanted candles, kerosene and gas, and the electric street car displaced the stage coach and horse car, so will the slow-going ox and expensive horse be superceded by that most useful invention of the twentieth century, the electric truck.

THE PRESIDENT. Gentlemen, this paper is open for discussion. We have a long list of members who are going to participate in the discussion, and the hour is getting late, so if they will make their remarks as pointed and as concise as possible, it will hasten matters. I will call on Mr. Rollins of Worcester.

Mr. Rollins. Mr. President and Gentlemen: I did not imagine for a minute that I was listed to discuss the electric vehicle. Therefore I am not prepared to remark at length on this subject. We have been a pretty good manufacturers' consumer in the last year and a half of electric vehicles, having purchased quite a number. We are endeavoring to make some sales in our city, the problem, however, is quite a difficult one and I think it is much more difficult than the introduction of the electric appliances. We have commenced to do some electric vehicle advertising and have engaged a man who practically devotes his entire time following up this branch of the business. His efforts thus far have been rewarded with one sale. A great deal of missionary work is necessary I find and it is a matter of educating the public to their use before many sales can be made. This was the experience that was found in Hartford. I think for the first year there were only one or two sales of vehicles made, but the persistent following up of the business has led, as I understand it, to the sale of 35 or 36 trucks last year.

Mr. Fred H. Smith. I think Mr. Rollins has covered mostly what I was going to say except as to costs. On July 1st we started in to keep in detail the actual cost per mile for operating the trucks that we have. We have eleven trucks and runabouts in service now, and have bought three more, making fourteen altogether. I do not know whether these figures will be of interest to you or not, but I have brought them along and you may have them for what they are worth. Our costs include interest, depreciation on five year basis, garage labor, repairs, tires and current at .03 per K.W.H.

Our two ton truck, which takes care of all of our heavy work, drawing freight from the freight depots and taking care of our line gangs, cost us in July, 23.3 cents per mile; in August 14.7 cents. The cost are all governed by the monthly mileage.

A half-ton truck that we have has been out of service for the last month, so that the figures will not be of any service.

We have a half-ton service truck, which is used in our meter department, and in August this cost us 29 cents per mile.

We have another half-ton truck that is running about twenty hours out of the twenty-four on trouble and service, and in July this cost 7 cents per mile and in August 5½ cents, which goes to show that you have got to get the mileage out of your cars in order to get your cost down to anything reasonable.

Now our runabouts. We have five of these and three cost us 18.7 cents, 23 cents, 10 cents. We bought two runabouts in June and these cost us 8 cents, 5½ cents in July and 12 cents and 4.8 cents per mile in August. These are used by the superintendents of the different departments. One last month covered 1,322 miles, the other one 1,200 miles. We have had these cars hardly long enough to be able to tell just how they are going to stand up under the work.

We hope by keeping these records that at the end of a year we will know pretty nearly where we get off with the use of electric trucks and runabouts. One thing we are sure of and that is we are getting very much more work out of our men and also reducing the cost of operating our Construction and Service Departments.

By the use of electrics there is no doubt in our minds that the saving in lost time in labor will go a long way toward paying the first cost on the car in a year or two.

MR. THAYER. The paper under discussion contains a letter from a Hartford teaming firm. One day last winter the driver of the truck owned by this firm came into our station. He arrived safely, but once off the truck his condition proved such that he could not take care of himself. This man had been running his electric truck through the streets without accident. I think this incident proves the electric truck to be a practical substitute for horses. The letter referred to proves that electrics are money savers, compared with horses for the figures kept by this truck man are exact in the extreme.

The Hartford Electric Light Co. has taken the agency for one make of truck. This course, on the part of a central station, is criticized by some, but we believe the results obtained justify our method. For the purpose of reducing the investment cost of electric trucks simplifying their operation and eliminating the usual mileage limitations, the Hartford Electric Light Co. originated the Edison Battery Service System about eighteen months ago. This system has proved extremely popular, as every one of our trucks in Hartford is now operated in this way and several of them had to be changed over. The first truck started on this service on June 5, 1912. There are today 36 trucks sold to our customers for operation on the service, the last order coming in last Saturday night. Besides these, there are ten in use by our company, making a total of 46. With 40 of these trucks on the road, the total exceeds 1,400 miles per day, with maximum mileage for a single truck as high as 80 miles per day. Battery service charged for on a mileage basis is a decided success.

Mr. Hunnewell. Mr. President and Gentlemen: Four or five years ago the Lowell Electric Light Corporation purchased two small runabouts and endeavored to get some information regarding electric vehicles by their use. We were very much pleased with the results we obtained, although at that time the machines purchased were not as carefully built and as fully developed as the machines that are now available. We did experience some difficulty, but we were sufficiently well pleased to be enthusiastic over the prospect of the use of electric vehicles. Some three years ago we purchased four trucks one 750 pound, one 1,000 pound, one 2,000 pound and one 3,000 pound machine, and have used those for the work of our company every day since that time. We have been very much satisfied with the use of these trucks. We have discovered by keeping careful data that the time saved to our employees has offset very largely the cost of operating the trucks; that is, the time saved to our linemen in going from one job to another was in itself nearly sufficient to offset the cost of operating the machine. Nearly a year ago we built a fireproof garage approximately 50 feet wide and 100 feet long, which will care for from 25 to 35 trucks, of course, including our own. This garage is equipped with proper rectifiers, motor generators, and is also connected with a steam unit in our station, which is adjacent, from which steam unit we can charge any battery which is manufactured today and probably any battery that will be likely to come on the market within the next few years. We feel that we are in a position to take care of the electric vehicle business that comes to Lowell, and we are thoroughly convinced that the business is going to come.

We not only have done these things, but we have already started out after the business; that is, we have secured the services of a solicitor, and already we have sold two electric vehicles. One has been in use more than a year, another is just being put in use. In addition to these that we sold by our own personal efforts we have co-operated with vehicle salesmen, and in Lowell there are two machines operating in a textile mill, a third operating in a textile manufactory and a fourth just to be delivered in a large bleachery of that city. It is true that a great many electric vehicles in Lowell will undoubtedly be charged from the isolated plants maintained by these several mills. As you know, Lowell is a textile city, and of course many of these large plants maintain generating equipment and will charge their machines from their own stations. We are, however, as enthusiastic in selling these vehicles to customers who may not use our current exclusively for charging them as we would be to customers who will charge directly from our service. We feel sure that the broad policy is the one to follow, and the more machines that can be used in Lowell from day to day the better results we will obtain.

The future of the electric vehicle is indeed bright. The electric vehicle has all of the good qualities that could be desired in any motor controlled piece of apparatus, and it has only one drawback, and that drawback can be easily overcome, if it can be approached in a careful, reasonable way. Of course you know that drawback is simply the matter of mileage, and if the machine can be sold to a customer with intelligence and care there is no reason in the world why the customer cannot have absolute satisfaction from the operation of that machine. The machine is so very far superior to a gasolene machine that there would be no gasolene machines used whatsoever if it was not for the one simple thing of mileage in the electric vehicle. We all know that it is perfectly easy to obtain long mileage from electric pleasure vehicles today. They will cover a reasonable amount of distance. And we all know that the electric trucks are now built and so designed that they will cover any reasonable distance within city limits, and if confined to city work they will always prove to be satisfactory. I would suggest that the vehicle manufacturers and salesmen both discover some means of satisfying the prospective customer regarding the mileage that the machine will do; that is, if they could make some reasonable guarantee of mileage, possibly select in every city where electric vehicles are being pushed by the central station, a road which represents the average streets in that city, and sell their machines guaranteed to cover that road during all weather conditions, or perhaps stipulating what the weather conditions may be. If the prospective customer can be satisfied that the electric vehicle will cover the ground that he needs to cover, there is absolutely no other argument necessary to sell the machine. The machine can be operated by any man that can drive a horse, and you can also place the machine in the hands of operators that are questionable; that is, the machine can only run at a certain rate of speed, he cannot race the machine and he can do very little to an electric machine that will result in harm.

I believe that we are just entering the era of electric trucks, and that within the near future—within the next five years—we will see the electric trucks enter the field of the grocers, the market men, the small hardware firms, all of the little firms in the small and large cities that are now using a horse drawn vehicle. It is probably well known to all here, that some of the most successful men in the manufacture of electric apparatus and electric trucks are already experimenting with light electric delivery wagons that are equipped with inexpensive batteries, inexpensive motors, and are built at moderate cost, so that the vehicle can be sold to the grocer or market man at a price which he cannot afford to overlook, and it will place in his hands a machine that will be reliable and efficient, and one that will do away with the necessity of horses altogether.

MR. DAVENPORT. Mr. President and Gentlemen: I think our Mr. Skinner can discuss the paper much more intelligently than I can. He is much more familiar with electric vehicles. I don't know whether he is in the room or not.

THE PRESIDENT. I will call on Mr. Skinner.

MR. SKINNER. I think there are several points that have not really been touched on in regard to the establishment of public garages by the central stations, and the rate which should be charged for that service. In our own city the price for electric charging current, where the customer owns his own rectifier, is 5 cents a kilowatt hour. Our local garage makes a price of 7½ cents a kilowatt hour for charging the same car, which is due to the fact that they are located in the alternating current section where it is necessary for them to transform this current by means of a motor generator set. Now if the above garage sells its direct current charging service at the price of 7½ cents per kilowatt hour it must stand the loss of transforming the service from alternating to direct current, and will actually receive only 5 cents per kilowatt hour after deducting the motor generator losses.

Assuming their motor generator efficiency is 66-2/3% the garage actually pays for 1½ kilowatt hours of three phase service for every kilowatt hour of direct current service sold to the vehicle owner.

In the down town section of most cities a garage can purchase 114 volts direct current from the central station free from the above transforming losses and sell this service direct to the vehicle owner at 5 cents per kilowatt hour.

Assuming that both of the above garages purchase power from the central station and pay exactly the same rate, it is necessary for the garage located in the alternating current section to charge the vehicle owner 7½ cents per kilowatt hour to obtain the same net profit as the garage located in the direct current section may obtain from selling the same amount of current for 5 cents per kilowatt hour.

In case a central station sees fit to establish an electric garage how can it justify a rate of 7½ cents per kilowatt hour in the alternating current section when it charges only five cents per kilowatt hour in the central part of the city where it has a direct current distribution system? In any case I believe that a central station garage should sell every kilowatt hour of charging current at a price that would yield a profit to a private garage operating under similar conditions.

Another interesting point is the question whether a central station should sell electric vehicles and what methods it should adopt in selling them. In selecting a line of cars suitable for a central station we find that certain vehicle concerns build everything from 750 pounds capacity up to five tons, others from 500 pounds to four tons. Some have a standard battery equipment which may be charged from a 114 volt service, such as 44 cells lead battery, or 60 cells Edison battery; others have 30 cells for some of their cars and 44 cells for others.

One manufacturer may have a 30-cell 750 pound delivery wagon having a 13 plate battery, while another has a car of similar size equipped with a 44 cell 9 plate battery, giving the same mileage. It is a case of smaller sized cells and more of them, and assuming that they are charged from a 114 volt service he will have an efficiency of about 90% in one case and only about 70% in the other. The actual cost of operating the 30 cell car might easily be 35 per cent. higher than the 44 cell car of the same capacity, mileage and speed. It is a very small thing in itself, but it is a matter that in our own city has already become quite serious. A local department store has in use an electric delivery wagon of 1,000 pounds capacity. This vehicle has a 60 cell A-4 Edison battery and is supposed to be charged at 108 volts. They have since purchased another 1,000 pound car with a 30 cell lead battery that is supposed to be charged at 75 volts. The difference of 33 volts will be nothing but waste. When they get the bills for charging those two cars, even if they had lead equipment in both cases, they would wonder why one costs more than the other and the extra cost would lead to considerable dissatisfaction. Every member of this Association can do more to further the interests of the electric vehicle by realizing the lack of uniformity, and in trying to impress upon manufacturers the value of standardization of batteries and cars so that the conditions which I have enumerated will not continually give black eyes to the industry.

MR. WELLES E. HOLMES. Mr. President and Gentlemen: About three years ago we started in to equip the place with electric vehicles. I won't start with the coal trucks, because those came last. They were the very last ones that we bought. In casting about for what the company wanted it was early evident that the thing we most desired was what would do for a meter cart in the day time and a trouble cart at night, for use practically eighteen hours a day, to be kept going as being, as someone else has said, the best means of using an electrical vehicle to get the mileage out of it. After talking to the manufacturers and seeing the salesmen it was evident that there was no such cart to be had. They all wanted to sell a 750 pound or a 1,000 pound wagon to do that light work, that is, to carry one man, three or four meters, a tool box, and at night a step ladder and a box of lamps. We, therefore, thought we would buy the chassis, and we did. We asked first the builders to build a body for us, but the cost was so out of proportion to what we thought it ought to be that we made a rough design of it and had the body builder right there in Cambridge do the job. We have built three or four of those in that way; bought a coupe chassis and put the body on it, with the step ladder either housed inside as a part of the body or carried on irons outside, and I will say that that method of handling the business and getting the cart that we wanted has been entirely satisfactory. We have in use there at present two Waverlys, one Rauch & Lang, one Bailey, one Columbus, one Babcock, one Walker and two 5-ton General Motor Company's trucks,—somewhat of a circus, but our object was to get at in a year or two what was the best one for our use as regards those that were all alike, that is, the small ones.

As I say, I have not the data here at my hand to tell you exactly about these vehicles and their cost per mile. I will say that data on each car is accurately kept and everything is put in, and I am going to depart from neutrality a little. We have talked somewhat during the summer and spring that some time we ought to have a "knocking convention," that it would do us more good than any other one thing, and so I am going to make a few remarks right off the bat about these cars. These results may have been mistakes of ours; I will admit that some of them were.

The Rauch & Lang car. The Rauch & Lang people would not build a body that we wanted for any money. I went to Cleveland, went into their factory, spent a day there with them. We bought their chassis. Their machine work, is the finest I have seen of any chassis work. They advised Motz tires. We put them on after telling them what roads we had in Cambridge, some pavement, some asphalt, some cobble. That Rauch & Lang had lead battery, exide. The exide people knew the car it was going into and the roads we had. We have had a whole lot of trouble with the Rauch & Lang on account of the tires, and the tires have been accountable for the trouble of the battery to a great extent. We have taken off the tires on the drivers, (the hind wheels), and substituted the Goodrich electric, and the troubles of that car have come right down. It has increased its speed about two miles per hour. It bids fair now to be a great improvement over what it was.

The Bailey got into trouble within three months to the extent of $64 on account of mechanical troubles with the frame. We have fixed that, and the Bailey car is doing good work now.

The Babcock is new. We have nothing to say about that yet. It is a new second-hand car.

The Walker truck. We had trouble with that by reason of their being no reach rods. On backing up and setting the brakes it caused the springs to open, and we had a good deal of trouble with that. The Walker people stood back of it, and that matter has been straightened out and mechanically made correct.

The Waverly chassis with the body that we built ourselves for meters, carrying a step ladder housed, and for trouble work at night or patrolling at night, is the best of all the cars. It has the best record. It is the least trouble. It has Edison battery. As you know, some of these have Edison and some lead. We are trying them both. But the Waverly car, which was the Waverly coupe chassis with a body built by us in Cambridge, is thoroughly the best thing we have.

The two 5-ton coal hauling trucks of the General Motor Company's make are rather too new to have any data on, that is, really to be given out or really to be of any use. They have not gone on to their job yet. We have had them three months on hauling lumber, heavy transformers, freight, dirt, gravel, sand, cement, and perhaps you have seen in the electrical press—I saw it, I did not know it was going to happen—that those people had advertised those two trucks under the name of the Cambridge Electric Light Company. After coming to the works and going over the records and noting the performance of those two trucks, they saw fit then to put in the Electrical Review and Western Electrician, I think it was, a page advertisement showing up the performance of their own trucks, unknown to us.

I cannot place too much stress on the matter of accurate records. We can go in Cambridge to a coal man and ask him what he is doing with his trucks, and he will tell us, and in a few minutes' conversation if you corner him down you will find out that he actually does not know what he is doing. To make this matter of any use to a body of this kind, accurate records should be kept and brought here and shown up, and picked to pieces. If I had known that this was coming to me I could have brought such records and made them available to you all.

There is another point that I want to make, the advisability of having a chauffeur or driver for every vehicle if you can. Now, we little fellows cannot, it is out of the question. But more of the troubles come from what you might call the diversity factors of different men handling that car than probably from any other cause. Obviously in a small company, where you have a meter team that is going all day, different men have got to go with it. The patrolman takes it at night. You have got to do that to get your mileage, if you are going to keep your cost per mile down. The ideal way I think is to have a chauffeur, if you can, and let him stick to that car and drive it, and drive your other workmen, and not have everybody handling it. But, as I say, in the small central station you cannot do that, and we don't attempt it in Cambridge.

Our general conclusion on the whole matter is that we started in to reduce our stable, horses and teams, and we are still at it, and the showing on our electric truck business and wagon business is such as to encourage us to keep on, and we shall add from time to time until the horses are all done away with.

Mr. Bent. Mr. President.

The President. Mr. Bent, we will call on you after we get through with this list, if you will kindly wait just a moment. Mr. Day of Malden? Will you tell us how you use electric vehicles in construction service work?

Mr. Day. Mr. President and Gentlemen: I might state that we have at the present time six electric vehicles in use. We did have nine, but two of them were of the old type, fixed over, and we found that by the proper use of the later model cars we could do away with the use of the other two vehicles. We have had extremely fine results from the use of electric vehicles. Of course when we first started in we had our troubles. It was our fault entirely. We did not understand the use of the vehicle, we did not realize the amount of work that an electric vehicle could do, and we did not work it up to the load factor which it required. We did not, as Mr. Holmes has spoken of, keep in the first place the records which we should have kept, but after establishing a complete system of records, so that we could tell exactly what the cars were costing us, what we were doing with the cars, we were able to extend the service of the cars until today, out of the six cars, we have but two that do not work over eighteen hours a day, and we have two to three different drivers during that time on some of the cars. At first we had trouble with the men in their not being familiar with the use of the car, but we find by the continual use they are all becoming familiar with same and it is becoming a tool in their hands, the same as any tool which they use in their business, and they are becoming extremely efficient in the use of it.

We have quite a number of different makes of cars. We have worked along on the same idea that Mr. Holmes spoke of, that we wanted to try them out. I am not in any position to criticise the different makes; I might say I am satisfied with them all. It is a good deal as the paper we had today on appliances expresses it, you can have three or four or five different makes if you want to, and efficient ones. We have extremely fine results from our light delivery cars. We find that they are as flexible as the horse and are ready for use at any time if you only just treat them fairly. That is all there is to it. We have kept these cars going now for nine months. One of them has now run nearly 18,000 miles during that time. and you see to get this mileage at the rate they run the car has got to be at work, and it has been at work. The other car could have done equally as well if I had had the work for it.

One thing I would like to speak about at this time is not the use of the car so much by the central station as what the central station is going to gain by the use of the car by outsiders. We had a case with a coal company that were buying about 1,200 kilowatts a year of us, running small motors to run a saw, etc. We influenced them to put in an electric truck, and after running it four or five months they decided to put in another. I find that their current consumption now is about 30,000 kilowatts a year instead of 1,200. That is pretty good business, and all of that is sold to them after half past six o'clock at night. I think that the central station cannot do any better than go after this business. It is good business. I was very much pleased with Mr. Hunnewell's remarks about the work that he is doing in Lowell, and I hope that our companies will do the same. I think it is entirely up to the central station man to get out now and get that business.

Mr. Codman. Mr. Chairman and Gentlemen: There can be no doubt whatever that the electric vehicle is a splendid thing to have on the lines of an electric light company. The business is one of high load factor. It is usually off peak. The revenue obtained per kilowatt of maximum demand is high, and in addition the absolute revenue brought in from any one vehicle is high. A truck of fair size will bring in more revenue than a house, and even a pleasure car will bring in from $10 to $20 a month. The business is good if you get it, but in order to get it, it must be gone after in the same spirit that you go after lighting and power and other forms of load. You must be willing to assume some responsibility for the owner of the electric car in your town, and you must be willing to spend some money to get the business.

Speaking for the pleasure car, in which I am most interested, one way in which it can be greatly encouraged is by enabling the mileage radius to be increased. At the present time electric cars can go on one charge of battery a very long way. It is possible now to go from 75 to 100 miles on one charge of battery at a speed equal to the ordinary time of good cars as the result of improvements in cars and in storage batteries. If we, in touring the country, could easily obtain charging facilities in every fair sized city, a tremendous impulse would be given to the electric pleasure car.

The Electric Motor Car Club of Boston publishes a list of the electric charging stations in New England, and it is rather discouraging to find, taking the state of Vermont for example, that there is only one station reported as being ready at all hours to charge electric vehicles. There are only two in New Hampshire I think, and one in Maine. The few others that are listed will charge provided they are notified some time in advance, and that generally means that a certain amount of preparation, wiring, etc., has got to be done, and this is not very satisfactory to the central station nor to the user of the car.

I am not in any way accusing the central stations of being unwilling to charge electric cars which come through their town. My own experience is that they are more than willing to help when you get there. They will take any amount of trouble, will do special wiring for you and spend a lot of time to help you out; but they are not prepared in advance, and very generally speaking they do not realize the conditions and do not know what you need.

I have personally toured all over the eastern part of Massachusetts in my electric car. I have been a number of times up to Springfield. I have been up to Greenfield. I have been repeatedly, of course, to Providence and other places equally distant. This summer I drove to the boat races at New London. I have been three times to the head of Buzzard's Bay, and twice to the southern side of the Cape, so that even with the present conditions you will see that it is a practical matter to tour in the electric automobile. It is futile for the central stations to say that there is no use being prepared, as the cars never come round. Of course they never will come until they know that they can get service.

THE PRESIDENT. Will Colonel Bailey of Amesbury tell us about his trip from Boston to Burlington by electric vehicle?

COLONEL BAILEY. Mr. President and Gentlemen: The hour is late, so I won't make any remarks on the sale of current or cap what Mr. Codman said; I will simply read this brief account.

This run was made to try the performance and availability of this type of car and of the Edison battery through supposedly difficult country and over a route never before attempted by an electric car, and, being successful in this, to demonstrate to the residents of the sections and to the members of this Association in convention that the era of the electric roadster automobile had really arrived.

Of course we had made long distances in other directions. I had been from Augusta, Me., to Philadelphia, and across from Providence up this way, but I wanted to see about the adaptability of the car for these roads and to find out for myself about this matter of charging facilities.

The performance accomplished could be considerably improved by repetition. The operator had never before been over any part of the road beyond Concord, Mass., and had never even visited any of the cities or towns except Fitchburg and Burlington.

The road was from Boston to Fitchburg, then through Ashby, Jaffrey, N. H., Dublin and Marlboro to Keene, N. H., thence, in the evening, through Walpole and Bellows Falls to Springfield, Vt.; the next morning via Ludlow to Rutland, thence through Brandon, Middlebury, New Haven and Vergennes to Burlington. Total distance 258 miles, including many detours of from two to six miles on account of road repairs.

People who have been over this route will notice that some parts of it present many difficulties in relation to speed and even in relation to power.

The average speed for the whole distance covered was exactly 19 miles per hour. The total running time on the road was 13 hours and 35 minutes. The slowest run, from Keene, N. H., to Springfield, Vt., 42 miles, at 16.7 miles per hour, was made almost entirely after dark in a strange country. The fastest section covered was from Boston to Fitchburg, at 21.3 miles per hour. That could surely be improved. The 76 miles from Rutland to Burlington (including detours) was made at exactly 20 miles per hour. The hardest part of the route was from Springfield, Vt., to Rutland, through the mountains,—it was fairly mountainous, with repeated descents into valleys; through several places where roads were under repair and we could not make detours but had to go through them.

No adjustments or repairs of any kind were required or made on the way.

The car was a model E Bailey roadster, equipped with 60 cells of the Edison battery, of the new A-5 size. It was not a special car, being an old demonstrator that had been run over 10,000 miles in the last eleven months or less.

In charging no attempt was made to run the car an extreme distance on one charge. I don't think that is good touring practice, and it is not necessary. The car was given a full, normal charge before leaving Boston. No full charge was given the battery en route, but partial charges were taken at five different places,—Fitchburg, Keene, Springfield, Rutland and Middlebury, at rates varying from 30 to 150 amperes.

I will say that my intention was to run to Fitchburg and take a half-hour boost or so at a high rate during breakfast, —starting early,—then run to Keene and take a noon boost of an hour at 100 or 150 amperes and run to Springfield, that being as near the mountains as I could get, then run to Rutland and take another one and a noon one at Middlebury, coming in here early in the day. The schedule was interrupted owing to the fact of not being able to get a charge. Central station men were invariably kind to me and did everything they could, but in only one case were facilities prepared, it took anywhere from 1½ hours to two hours to get under way, and in several cases not very satisfactory at that. In each case something interrupted. I wanted to get along, so I would go on a partial charge from time to time.

I don't think that the future of the electric vehicle depends upon long distance mileage on one charge. Since we have accomplished long distances I can speak fairly on that matter. I think it depends entirely upon facilities for frequent charging. It would not develop the electric industry very much for me to be able to run from Keene here on one charge, or from Boston to Keene or Boston to New York, or that sort of thing, because somebody might want to sell cars in Worcester and Hartford and up this way, and Marlboro and intermediate places, all the way through, and go from point to point. Then if you could get charging facilities at frequent places we could carry a smaller battery, a less expensive battery. With the battery which we have now, that can charge on a boost at a high rate, if a person can charge during meal hours, or start in the morning and charge at noon, why, it is all that is necessary. A forty, fifty, sixty or seventy-five mile run between breakfast and noon, or between noon and night, is enough for the average tourist. If there is any lesson to be drawn from this trip for me, it is that the future of the electric industry as it relates to the passenger vehicle depends almost entirely upon preparing fairly good charging facilities on the road.

Mr. Mansfield. Gentlemen, in Boston we are very enthusiastic about the electric vehicle, because we believe in it, and we believe in it because we have figures and experience which show that it is a coming vehicle, that it is something that we can use for our own use and that we can recommend to our customers. The history of the central station business has been first troubles, then investigations and scientific research, the overcoming of the troubles, and consequent success, and we cannot expect that the electric vehicle is going to be any different from any other part of our previous experience. It is true we are going to have trouble with electric vehicles because we try to use them for something that is not intended or in a capacity that should not be tried, but just as soon as we get the electric vehicle in its proper sphere and use it as it should be used we are going to find it should be very successful.

Improvement of roads and other things that have been discussed here it seems to me are not exactly in line with the subject of the paper. What we want to discuss today, what we are looking at, is the advantage to the central station. It may be that it is a wrong term to use of an electric flat iron or a toaster to call it a current consuming device, but it is exactly the term that should be used in connection with the vehicle, because it is a current consuming device and it is that part of it that brings it to our attention more closely. If it were not a current consuming device we would not be so much interested in it. Not only because it is of monetary advantage to us, but because the customer can save money at the same time our business is increased! It is rather a peculiar condition of affairs that the central station, who sell the current, and the manufacturers, who get their return from the sale of electric vehicles, are the two agents who are the least enthusiastic about electric vehicles. Put the electric vehicle into the hands of a user who uses it right and does get what he ought to get out of it, and he is very enthusiastic. It is a good deal easier to sell a man a second machine than it is to sell a man or firm the first machine, because he knows what it will do. The users are very enthusiastic.

It seems to me that the list of testimonial letters which are included in this paper shows conclusively that throughout the country, even under the present conditions, which in some cases we will admit are poor with some of the older machines, they are eminently successful, and the electric vehicle association has a number of letters, which are not included in this paper, I understand, which show that the public are satisfied with the electric vehicle. If that is so, why shouldn't we as central station men accept it and adopt it? Why shouldn't we do the same with this as we did with mazda lamps and with the heating and the cooking devices,—I won't say devices, apparatus? We shied at them at first. We finally allowed some of our men to experiment with them, and then eventually we adopted them and now we are pushing them with all our energy. All of the central stations are going to use electric vehicles eventually. The sooner we get down to it the sooner we are going to increase our income. There is no doubt but what the electric vehicle is the one thing today that is going to bring more income to the company for the amount of money expended to bring it in than anything else.

The President. I will now call on Mr. Day Baker of Boston for his views from the electric vehicle manufacturers' standpoint.

Mr. Day Baker. Mr. President and members of the New England Section convention. As an officer of the Electric Vehicle Association of America, and President of the Electric Motor Car Club of Boston, I wish to thank the president for giving me an opportunity to say a few words to the New England Section. I can assure you that my remarks will be very short on account of the lateness of the hour.

First, I would like to comment briefly on some of the remarks of previous speakers.

Much stress has been laid by some speakers on the cost per ton mile of the loads carried, and the costs per mile. While all of the figures named have been economical and interesting I think at this stage of the art that it is entirely unnecessary in discussing this paper to go into these details, when it is admitted by practically all of the great shippers of the country that electric vehicle transportation is more economical than horses. We should look at the electric vehicle question in the broadest sense, and say at once that it is a *better* and more satisfactory method than horses. A Boston merchant said to me, "You lay too much stress on the cents that you are saving us per bundle. We are going to use electric vehicles for our work because they are economical, clean, easy to handle, our customers like prompt and frequent deliveries, and because they are satisfactory. We could perhaps light our store with candles or some form of kerosene oil or gas cheaper, but we use electric lights because our customers like them, and because we like them and think them the best. And so you should spend more time in arguing that the electric vehicle is the *best* form of business vehicle, and not go too much into the fractions of a cent per mile saved. Horse deliveries were never figured that way by the business man." And I might add that we seldom find anyone who has accurate figures on horse drawn deliveries, but when we do they are 20 to 40 percent above the electric vehicle costs.

Almost the same thing might be said of current cost for charging. I very seldom go into this detail with a customer. I say, "No matter what your cost for current may be, you will forget it at the end of a year, and will agree with me that the total bill is so reasonable that nothing would induce you to return to horse drawn vehicles." Therefore I say to the central station men, get your charges as low as consistent with good business practice, and your customer will be satisfied. Don't spend hours of time on the academic question of the difference in cost between alternating or direct current, but put the same amount of energy into urging your customers to adopt the electric vehicle, and the increase in vehicle use will cause the current cost to care for itself.

Referring to Mr. Holmes' remark that he was obliged to design light vehicles himself, I would say that there are a number of vehicle manufacturers who will gladly build light electric vehicles for lamp and patrol work, and thus save the cost of vehicle development work and allow the central station man much more time to devote to the manufacture and sale of electric current.

What I really wanted to say in my few remarks was this: The electric vehicle manufacturers are striving hard to make a great success of the vehicle business. Success to us means rewards for the central station man, for the two go hand in hand. The central station man can help us by assisting in moulding public opinion in favor of electric vehicles. This can be done by using vehicles for central station work, by advertising the good qualities of electric vehicles and the fact that current can be had at a reasonable rate for charging them. All the assistance you give the electric vehicle manufacturers will come home to the central station who is the one ultimately benefited, by the obtaining of a desirable load during the valley period.

The electric vehicle is progressing by leaps and bounds. The great transportation companies are increasing their fleets. Gimble Bros., of New York, after experimenting with other forms for transfer service have decided to use electrics for this branch of their work, in addition to the seventy or more electrics they are using on their delivery system. Jacob Ruppert the great New York brewer has just ordered ten more five-ton trucks to add to his present fleet of 112. Geo. Ehret Brewing Company, ordered last month ten additional electrics to add to their fleet of 45. The New York Railways have in service and on order 35 electrics for emergency and general transportation work. These are only examples.

One notable example of central station men's support is that of a large holding company which has decided to throw its influence in favor of the electric vehicle by arranging for an educational campaign of about forty companies under its control. The subsidiary companies will be encouraged in the use of electric vehicles, and in the recommendation of vehicles, under proper conditions, to their customers.

Speaking for the vehicle manufacturers, I would be remiss should I close my remarks without paying tribute to the central station men who are using their money and influence to assist the electric vehicle builders in placing this vehicle business on a substantial basis here in New England. We all recognize the great work and encouragement given us by Messrs. Charles L. Edgar and William H. Atkins of the Edison Electric Illuminating Company of Boston and Mr. W. H. Blood, Jr., of the Stone & Webster Corporation of Boston, who have early and late from the inception of the business given us such liberal and unflagging support. *Their efforts* stand out with such strength that I am sure our other friends will pardon me for not calling all of their names.

In closing let me urge you all to support this growing movement for the electric vehicle load. Don't *support* the movement for any sentimental reason or for the manufacturers' sake, but for your own good, your own profit, the ultimate reward will come to your own companies, your own pocket books, as affected by the raising of your valley load line, which in turn will be reflected on your receipts and the dividends you pay your stockholders.

Col. Bailey. I have just been asked a question about the cost of operation on my trip. Can I have just a second?

The President. Yes.

Col. Bailey. I want to say that we have established a new world's record on economy in motoring, since we had no trouble of any kind, and as no one charged anything for the current, it did not cost anything.

The President. Is there any other discussion on this paper? Mr. Holmes?

Mr. Holmes. Not on that paper. I just want to answer a question raised by Mr. Skinner of Providence, I think, about the rate charged from a motor generator set. I will say that in Cambridge we have a subsidized garage with a motor generator set. We have considered it in this way: We set a transformer at a man's house because we have not 110 volts there to give him. We set that motor generator set in that garage and charge five cents on the D.C. side because we are selling the juice to other people for five cents, either charging through a rectifier or by any other means. It is simply a loss to the company, you might say. It is at first, but that business will grow, so that we will be selling quite a quantity there, and we will only charge five cents for it, whether it is rectified or motor generator rectified or not.

Mr. Rollins. Before closing, Mr. President, I have a resolution which I wish to introduce.

Resolved, that the progress and strength developed by the electric vehicle interests warrant a proper recognition from the New England Section of the National Electric Light Association;

That the Chair be requested to appoint a committee on the recognition of electric vehicle interests, the endorsement of the electric vehicle to the people of New England, and to consider the best methods of increasing the load during valleys;

That this committee be requested to make a report at the next meeting of this Section.

The President. You make that as a motion?

Mr. Rollins. I make that as a motion.

(The resolution was adopted.)

The President. Gentlemen, we have had rather a long session this afternoon, but I think it has been very interesting. We have had a large amount of discussion on all our papers, and I hope that it will continue.

I want to call attention to the evening session, at 8 P. M. The paper is a very interesting one. It is a four-sided paper, entitled "Co-operation of Allied Electrical Industries. The manufacturer, the jobber, the contractor and the central station give their views. We want and expect a lot of discussion on this paper, so that we hope you will all be in attendance. This session is adjourned.

(Adjourned till 8 P. M.)

EVENING SESSION.

The convention re-assembled at 8 P. M., the President presiding.

The President. Gentlemen, I wish to make an announcement, that directly after the session tomorrow morning we would like to have the members, guests and ladies, assemble in the park opposite the Hotel Vermont to have a group picture taken. We trust all the members will be there.

The paper this evening is entitled "Co-operation of the Allied Electrical Industries." It is a four-sided paper. The manufacturer's side is taken up by Mr. St. John Morgan of the Westinghouse Electric and Manufacturing Company; the jobber's side is taken up by Mr. W. J. Keenan of the Pettingell-Andrews Company; the contractor's side is taken up by Mr. J. G. Gilliland, New England Engineering Company, Waterbury, Conn., and the central station side is taken up by Mr. Francis A. Gallagher, Jr., Narragansett Electric Lighting Company, Providence. I will call on Mr. Morgan to read his paper.

CO-OPERATION OF ALLIED ELECTRICAL INDUSTRIES.

BY

Manufacturer—S. St. J. Morgan,
Westinghouse Electric & Mfg. Co., Boston.

Jobber—W. J. Keenan,
Pettingell-Andrews Co., Boston.

Contractor—J. G. Gilliland,
New England Engineering Co., Waterbury, Conn.

Central Station—Francis A. Gallagher, Jr.,
Narragansett Electric Lighting Co., Providence, R. I.

CO-OPERATION OF THE ALLIED ELECTRICAL INDUSTRIES FROM THE STANDPOINT OF THE MANUFACTURER.

W. St. J. Morgan, Westinghouse Elec. & Mfg. Co.

A story was once told of a ship washed upon a beach by a storm; her crew were straining every muscle to move her off the sand-bar, but to no avail—not an inch would she move. Presently, a child ran down to the shore and added his small weight to that of the seamen, and shortly the ship slid off the bar into the deep water. It needed only a small amount of additional force which those working were unable to supply. This story illustrates roughly what can be accomplished by co-operation.

We are gathered as representatives of the four main divisions of the Electrical Industry; *i. e.*, central station, jobber, contractor and manufacturer. We are all striving for one end, *i. e.*, the increased use of electric current, because by so doing, we increase the sale of our products—that is the purpose for which we are in business. It has been said that every man, no matter what his business, is a salesman because it is necessary that he sell his own services, and so we are anxious, no matter to which branch of this industry we belong, to increase the sale of current because it ultimately increases our own sales.

Consequently, this idea of co-operation is not entirely an unselfish proposition, inasmuch as each one is striving to benefit his own cause, but in so doing we benefit each other, and therein exists the spirit of unselfishness which permits the inclination to organized co-operation.

As organized co-operation must lead to results desirable to all, it necessarily entails the united efforts of all, without which most effort is unbalanced and wasted.

The growth of the Electrical Industry has been marvelous, and it has been accomplished in spite of its spasmodic and undirected character, inasmuch as there has been little organization in the past to unify the various interests involved. In these later times we are learning to work together when a common end appears. We meet our rival competitors in friendly intercourse, exchange ideas and go away each strengthened and ready to pursue an aggressive campaign for legitimate business. Any casual student of national business economics recognizes that in the development of either a nation or an industry, real efficiency requires some basis of organization by which collective effort can be made to supplement, both morally and financially, individual effort. Combination, therefore, is essential; but just as essential is competition, and so a combination of the two under proper conditions should be productive of great good. The field of application of electric current offers vast possibilities in the way of development. The strides made during recent years are scarcely a measure of that which will come in the near future. Therefore, it behooves us to plan logically for obtaining the proper benefits to be derived therefrom. Whereas, the growth of electric service is increasing continually, due to the activities of its advocates, we must not lose sight of the fact that there are obstacles constantly in the path of progress.

Competition offered by gas and other sources of power, the apathy and ignorance of portions of the public, and most of all, the destructive prejudices existing in the minds of some people, render it necessary that the united efforts of the various interests be put forth in a form of organized cooperation. Such a campaign must resolve itself in one of education, and it may be said to involve the following ideas:

(1) To teach the consumer new uses of electricity that will add to household and business efficiency, and thereby decrease the cost of living.
(2) To teach the consumer how to use electricity more intelligently and economically.
(3) To educate the public in general as to the manifold uses of electricity.
(4) To establish in the mind of the public a friendly feeling towards public utilities, manufacturing corporations, and the electrical industry as a whole.

This last should follow, and in a way may result from constant efforts directed toward the accomplishment of the other three, but these efforts must be supplemented by educational work carefully planned and thoroughly administered. The public must be cultivated and taught that the day of "The public be damned" has long since gone, never to return; nor should we go to the other extreme of "The public be praised (flattered)," but adhere to the common ground—the only logical one—"The public be told." In other words, make it our confidant.

The public's confidence in corporations has, to some extent, been impaired, due in a great measure to political and other forms of agitation during recent years. The general attitude of the public towards corporations is well known; it has been led to believe that they give as little as possible, and take as much as they can get. We know that this is not true, and so we must tell others, and tell them in so convincing a manner that they will also know it. A great opportunity exists right here for co-operative effort on the part of the entire electrical industry in that jobber, contractor and manufacturer can consistently instil in the public mind a confidence in the central station interests.

Electricity is a popular subject in the abstract, but the concrete subject is so shrouded in mystery that it is difficult to instil its inherent advantages in the public mind, so this must be accomplished by demonstration of its applications. Again, the use of electricity is so prevalent that the average man fails utterly to grasp how entirely dependent he is on the use of it, and so he must be educated to a full realization of his dependency, thereby paving the way for its additional use in domestic and industrial service.

The question then naturally arises—How may this be accomplished? The answer is—Advertising in its largest sense, involving a broad plan of education. The manufacturers are displaying a spirit of co-operation by making large expenditures of money in various campaigns of national advertising, a large portion of which is directed towards the general use of electricity and not to any specific article of manufacture. Surely, this is real co-operation. It is suggested that the local dealers, contractors and central stations co-operate to the extent of accompanying these national campaigns with local efforts directed along similar lines. In this way, much more beneficial results can be obtained by allowing the national advertising to awaken the interest or desire, and the local efforts to promote the sales, these efforts to be such as may be deemed best by each locality. By so doing, we secure the effect of concentration of effort, and results are naturally greater. Here again is emphasized the utter futility of the manufacturers hoping to accomplish the desired results alone, as they must have the assistance of the local people who can give this not only by doing local advertising, but by talking and preaching electricity and its uses in their daily intercourse with people; above all, by rendering a high order of service. By this service is meant giving a customer not only just the amount of current or appliances he buys, but affording him that courteous attention to his wants which will cause him to return and look to the electric companies whenever he wants anything electrical, knowing that his wants will be satisfactorily supplied.

The manufacturer is generally the last one of the four main branches of the industry to receive any direct benefit from such a scheme of co-operation. He will, of course, realize his returns when the increased demands for current call for additional generating, transmitting and consuming devices; yet, it will be found that as a rule his policy has been a uniformly generous one toward co-operative schemes that have been proved worthy and for the good of the industry.

The central station is undoubtedly the greatest gainer from any movement that tends to increase the use of electricity, as the revenue in such case is a constantly recurring one.

If through co-operative advertising, the architect with the contractor and builder can be educated to the point that in all dwellings, regardless of cost, outlets for the use of electrical appliances will be plentifully provided, the business of the jobber in the electrical appliances will be increased, as well as the work of the electrical contractor. It is obvious that there will be a corresponding increase and demand for current for the central station, and the manufacturer in this instance secures his benefit from an increased demand for his manufactured products.

An extended education of the public in the use of electric vehicles brings its reward, not only to the manufacturer of the vehicle, but also to the manufacturer of the motor and battery which propel it, and continuously to the central station providing the current for its operation.

When real estate dealers and investors are cultivated by co-operative educational advertising to make capital of electrically lighted and electrically equipped homes and electrically equipped office buildings, a natural increase of business is bound to result therefrom, and as the ideas of men expand, the use of electrical energy will multiply rapidly, bringing increased revenue not only through the sale of electrical appliances themselves, but accessories, such as fixtures and glassware.

When we can familiarize men in the various professions, such as dentists, physicians, surgeons and others, even to the least important, with electrical matters; when we shall have succeeded in making men and women as familiar with electrical terms as they are with those pertaining to an automobile, then we shall have advanced a long stride towards establishing the universal use of electricity. And this is by no means an impossibility, because the familiarity with the automobile is due to the widespread popularity and use of the motor car, of which there is one for every 110 people in the United States.

Manufacturers furnish great quantities of literature for free distribution by central stations, jobbers and contractors, even with the latter's name printed thereon. These pamphlets are frequently of an educational nature, tending to persuade people to adopt the more general use of electricity. Such advertising matter and engineering data, when intelligently used, is in the aggregate a great force. In this connection, mention should be made of the excellent collection of data issued by the Commercial Section of this Association, and sold in quantities at extremely low rate. These are adapted for use in domestic, industrial, commercial and municipal situations.

The manufacturers are continually collecting data on the cost of operation of the various electrical devices, which data is generally available for the local interests, and often is of inestimable value in securing a customer or enabling him to increase his load.

Some of the manufacturers have provided moving pictures and lantern slides for distribution among theatres, parks, etc., which although bearing the manufacturer's imprint, are actually of an educational nature and are doing much to direct the attention of the public mind to the use of electricity.

There are a number of ways in which organized co-operation can be promulgated by the different factors of the industry, and they will be briefly presented.

Active co-operation would be greatly helped by the holding of meetings at frequent, preferably regular intervals of the central station people, jobbers and contractors in each city. By such meetings exchange of ideas and suggestions could be made as to local work that could not help but be beneficial and for the interest of all parties.

Closely allied with this is the question of local legislation and co-operation with Boards of Underwriters and Municipal authorities. Too frequently, adverse legislation and rules are passed because no concerted efforts were made by the industry to prevent them. Should the authorities realize that they were dealing with a united force that is earnestly striving for the public good, while at the same time protecting their own interests, they would be only too willing to meet the electrical representatives halfway and base their decisions on the good of all concerned.

The cultivation of city officials closely follows. Many of our central stations are setting excellent examples of this in extending courtesies to them in various ways, such as in the loan of resuscitation apparatus, fans for hospitals, etc. In such cases the industry should be advised, so that due publicity could be secured. These acts create a good feeling not only among the officials, but the public at large when it learns that such things are being done.

Excellent opportunities are offered for the education of the public by popular lectures on subjects closely allied with the uses of electricity before schools, clubs, church societies, lodges, etc. Illustrated talks on the history of electricity and some of its more noted applications would prove a good method of cultivating a taste for electric service.

Jobbers and contractors have splendid chances for encouraging its use by talking and preaching it constantly. For instance, when wiring a house, a man could easily suggest the addition of a baseboard plug for a fan, radiator, table stove, or any of the multitude of those devices which are daily making life more agreeable.

Closer contact with the newspapers in the various localities to the end that fires of unknown origin may not be attributed to "crossed wires," "defective wiring," and other set phrases reflecting on electric service, is a form of co-operation that could be put into effect by the local interests to the greatest advantage.

THE JOBBER'S CO-OPERATIVE METHODS.

W. J. Keenan.

Vice-President Pettingell-Andrews Co.

In your secretary's letter advising us of our selection to represent the side of the jobbers in a paper on "Co-operation of Allied Electrical Industries," it was suggested that what was wanted was a general fair and frank discussion of the whole subject, bringing out the different ideas of all concerned, and with this suggestion in our mind we will aim to give you the jobber's view.

For the past twelve months co-operation of the electrical interests has received the attention of the very largest minds and the biggest interests in the electrical field. The Society for Electrical Development, which is now well under way, will no doubt bring to the electric lighting interests numerous benefits in every field.

Co-operation always starts with self-interest as a cornerstone.

We ask co-operation of others for our own help, and yet all share in the benefits of the resultant work.

Closer co-operation is requested by our Association as something with which we are all heartily in accord. The "Get Together" method between the manufacturer, jobber, contractor, and central station will always effect a community interest in any commodity that is handled by them.

The jobber stands today committed to the belief that the natural course of merchandise is from manufacturer to jobber, then to the contractor, central station, etc., and then to the consumer. Surely it is only through co-operative measures that this channel may eventually be marked so well that no manufacturer, jobber, or contractor will care to deviate from its course.

The jobbers' desire and willingness to co-operate with the contractor and other allied interests is evidenced by their literature and their friendly co-operation with the contractors in all sections of the country as well as by their strong desire and aim to build up co-operation measures.

In a retrospective sense or method, we must commence with the central station. Without the central station the business would assuredly not have arrived at its present healthy stage. The central station being the producer, the source of energy for the use of the lighting and power appliances, is the one party whose methods will help and encourage, or destroy and discourage, the manufacturer, jobber, and contractor. From our point of view the central station should demand active co-operation from the contractors and jobbers in its territory, but in order to obtain this co-operation it must in turn give the jobber an unlimited field to sell electrical material through their definite channels. The central station that becomes an active competitor in the sales field of electrical appliances does not fulfill the true spirit of co-operation. The central stations can create a demand through their customers' lists and through intelligent advertising of the advantages obtained by the use of electrical appliances, and should require the assurance of the jobber in advance that these appliances may be obtained from the contractor or through other sales channels in the central station's territory.

A central station in any large city that enters the field of the sale of electrical appliances should not sell them at a price less than will show a merchandising profit. To our minds the future growth in the use of household electrical appliances will be so large as to equal the lighting load in many plants, and this will strongly urge the active co-operation of the central station in recognizing our claim for the proper marketing of these devices on a profitable basis.

We are also of the opinion that the free distribution of lamps for less than the regular price is harmful in the extreme. The consumer will always take what he can get for nothing, and his opinion of the company is that it can well afford this distribution. It seems to the author to be a very short-sighted policy for central stations to sell any kind of supplies below the regular resale for the following reasons:

No central station can do business at cost or less, and if one class of goods is sold at a loss it has to be made up somewhere else. In the majority of cases, probably, these charges do not fall where they belong. If this is a fact, the first thing the central station should do is to modify its accounting system so that its sales figures tell the true story. At the present time, with the very active Public Service Commissions and agitators who pose as friends of the "dear people," the central station will not be able to maintain their present rates much longer, when, by their own admission, the present rates allow them enough profit after all expenses are paid to allow them to give away lamps or sell lamps and other supplies at a price that good business judgment shows to be too low.

The central station should rule as to the quality of lamps and other appliances that may be connected to their circuits, and on account of the advanced method in the manufacture of most of these appliances today not much trouble would be experienced in having a standard set by the central station that could be easily followed by all jobbers and contractors, especially should this ruling apply to incandescent lamps.

The ultimate profit for the central stations is in the hands of the many agencies—manufacturer, jobber, and contractor, who are dependent upon the up-building of the mercantile end of our industry. The central stations can ill afford not to have this army of co-operators behind the business.

If we can get a closer union in this way with the central stations we believe that the central station's efforts should be directed to extending their service into locations not now enjoying electricity, and the jobber and contractor should have their sales force augment the work of the central stations in the selling of electrical appliances, each party thereby receiving the benefit of co-operative work.

There is probably no central station in the country but wishes well to the contractor and jobber and would like to see their business increase. Certainly the central station should welcome suggestions for bringing such results about if it can be shown that it is not at the expense of its light and power load.

Your secretary's letter also asked us to say what we are doing to advance our interests along the lines of co-operative work. Our company has devoted a large space in our store to the display of electrical household devices. These appliances are shown in practical operation, and are explained by competent demonstrators. Starting with washing machines we can demonstrate and explain all washing appliances, ironing, mangling, and heating appliances, vacuum cleaners, kitchen utensils, comfort utensils, etc., etc.

We have also devoted a great deal of time to placing on the market a complete line of fixtures, which may be purchased by the contractor in order that new houses may be equipped at very small cost.

These fixtures are shown in our Fixture Studios marked in plain figures, and are in sets comprising all the fixtures required for an ordinary house.

We believe that this plan, in use by some jobbers, should be advertised by the central stations in their literature or by their solicitors so that the best results will be obtained and intelligent knowledge given to users and prospective customers as to the methods of employing household appliances and the proper selection of lighting fixtures.

In addition to the above plan our company publishes a monthly house organ with a circulation of over 5,000 copies, sent to the trade and allied electrical interests, which brings out the talking and essential points on all new appliances and devices.

All our products are marketed to the consumer at the selling price, which would be obtained by the contractor or retailer. Consequently, our efforts are directed toward placing these purchases through the proper mediums, and in this way bring out the spirit of co-operation between the contractor and the jobber.

Now taking up the question of the manufacturer, as to his relation to our interests. The manufacturer stands today committed to the belief that the jobber is the one channel through which he should market his lines of material that can be used by the central stations, contractors, and their customers. The manufacturer who places his material in the hands of the jobber immediately locates a representative who can keep in touch with the central station and the contractor 300 days in the year. The jobber should be thoroughly posted and coached as to all the values of the material produced by the manufacturer, and there should be no uncertainty or doubt in the minds of the central station or the contractor as to the fact that the jobber is the representative of the manufacturer in the sale of his material.

The manufacturer is usually at a long distance from the user. He is manufacturing only one line of material and he cannot by any possibility afford to study the requirements of the user by sending his traveling men to them as frequently as can be done by the jobbing company.

The jobber handles the entire line of the users, central station and contractor, issues catalogues and price sheets, and with his traveling corps is ready to discuss with them their needs at any time. This has proved a sufficient reason for co-operative measures for the manufacturer to market his goods through the natural channel of the jobber to the consumer.

Manufacturers in selling their goods through the jobber should make sure that the jobber has a thorough knowledge of the material, so that he can be called upon to give information as to how the goods are made and the proper use of the same. In this way co-operation of the manufacturer with the jobber will be sure to bring advantages to him wherever his goods are sold.

The electrical jobber has been an essential factor in the evolution of the electrical industry, and without him it would not have been possible for that industry to have reached its present high state of development.

To the manufacturer, central station, and contractor the jobber has stood in the position of distributor, advisor, and advertiser; to the customer as missionary, educator, protector, and source of supply,—not to mention that of financier in many instances.

The great advance in electrical knowledge in the last ten years has given better and more thorough knowledge technically to the jobbing houses on most of the manufactured appliances in use by the central stations. As an example, showing how a jobbing house may become of value to the manufacturer and acquire the knowledge necessary to explain the technical and electrical value of their goods, we will take the case of the incandescent lamp. It was not many years ago when very few jobbing houses could explain the rated watt capacity of carbon lamps. Today we find that quite a number can thoroughly explain the difference between the carbon and the tungsten lamp and give an intelligent explanation of watts per candle power.

This information is of great help and along the lines of giving the public the right information and relieving them of the uncertainty which so often creeps out when an explanation is made in an abstract way or filled with technical terms giving no information to the listeners.

Manufacturers adopting this course will find their goods sell more readily, and other interests having recourse to the jobber will be more than pleased to note their thorough knowledge of matters in which they perhaps thought they alone were supreme, and in this way we believe co-operation of the "Allied Electrical Industries" will be bound to bring about the benefits we so much wish to obtain.

CO-OPERATION OF THE ALLIED ELECTRICAL INDUSTRIES FROM THE STANDPOINT OF THE ELECTRICAL CONTRACTORS.

By John A. Gilliland,

The New England Engineering Co., Waterbury, Conn.

From the contractor's point of view, the subject under consideration naturally presents itself under two headings, namely: Co-operation between the manufacturer, the jobber and the contractor: and co-operation between the central station and the contractor.

There has always been a feeling of distrust between the manufacturer, jobber and contractor. There are few industries in which there is such a tendency by the jobber to retail to the consumer at wholesale prices, as there is in the electrical business. The contractor or dealer is ignored. On the other hand, the large contractor does not depend on the jobber for many of his supplies, but buys direct from the manufacturer. Therefore, the jobber does not feel under obligation to protect the contractor. Some advocate the elimination of the jobber in general, contending that the present high cost of living is caused, in a large part, by the present system of passing commodities through several hands from the manufacturer to the consumer. In the electrical industry, the jobber is actually a necessity. The contractor requires such an enormous variety of materials with which to carry on his business, that it would not be practicable for him to buy a comparatively small quantity of each from a large number of manufacturers, particularly the small contractor, who is, by far, in the majority. If the manufacturer and jobber would get together on a mutual basis, the jobber selling only to electrical contractors, large industrial plants and railroads which would not solicit the services of the contractor in any case, the present feeling of distrust would, in a large measure, be replaced by confidence, and a co-operation established that would be of benefit to all.

From the fact that this paper is addressed primarily to central station managers, our principal interest will be the subject of co-operation between the central station and the contractor. Let us consider first the illegitimate contractor who is largely responsible for the existing feeling of suspicion of the central station and the public against the contractor. He is a man without responsibility or honor, his word is defective from either ignorance or dishonesty. The ease with which such a man can get into the contracting business is surprising. A fair knowledge of wiring and an elastic conscience are the only requirements. You will usually find "Electrical Engineer" on his business card.

This type of contractor cannot be too severely condemned, and should be eliminated from the game. A License law, which has proved effective in some localities, should be made universal. A law that would require the contractor desiring to secure a license, to prove that he has the ability to conduct such a business. If it is found that the licensed contractor is deliberately doing dishonest work, contrary to the "National Electric Code" his license should be revoked. The lack of rigid inspection, or the lack of any inspection at all in many localities, gives the above contractor an opportunity to do dishonest work which he is only too ready to take advantage of.

Many central stations will connect with anything, regardless of the character of the work. Their only interest, apparently, being to see that a meter is installed and working properly. For example, a house was recently wired with bell wire, with wood base switches to control the lights, and was connected without question by the electric lighting company. This, of course, is an extreme case, but it is not at all uncommon to find finished house wiring fished in without flexible conduit, or any protection other than the rubber cover and braid on the wire, and not always rubber covered wire at that. In communities where there is inspection, short pieces of flexible conduit are sometimes fastened at the outlet, the rest of the wire being unprotected, and the "bluff" passes. Many wiremen are instructed to do this kind of work by their employers. Some do it on their own initiative, and are very much surprised, when employed by a legitimate contractor, to find that the practice is not universal. It is certainly marvelous to what an extreme an unscrupulous contractor can go and get away with it.

The average property owner has no idea of the risk that he is taking by having his work done by an incompetent or dishonest contractor. There is not only the danger of fire from defective wiring, but the chance of vitiating his insurance when he has had a fire from any cause, and the insurance adjusters find that the wiring does not comply with the "National Electric Code." Again, if by any chance, an insurance inspector should discover the defective wiring, the property owner would get no redress from the dishonest contractor. The central station can do much to rectify this condition, in fact, has the whip hand; and can refuse to connect until the work is done in accordance with the "Code." The owner, if properly approached, will thank him for his interference.

Then we have the misguided, but honest electrician, who, because he is a good electrician, thinks that he would make a good contractor, forgetting the fact that the one is a trade, the other a business. He should have our sympathy. His name is legion. After one, or perhaps two years of heartbreaking struggle with the problem, he is back in the ranks and another is ready to take his place, eager to learn by experience what he should learn by observation.

The up to date and progressive central station has a commercial department which has become a valuable and important part of its organization. The commercial manager is, of necessity, a man of education and ability. He recognizes the importance of co-operation in present-day business, and it behooves the contractor to work in harmony with him to the advantage of both. If the contractor is alive to his opportunities, he will see to it that he cultivates the goodwill of the commercial manager, and will find that he is usually ready to meet him more than halfway.

There has been a large diversity of opinion among central station managers as to whether or not the central station should do wiring. During the early days of the electrical industry, the central station was the leading, and often the only wiring contractor in the community. Some of them operated at a profit, others made the installations at cost, and, in many cases, without charge, in order to create a demand for current. It is no longer necessary that the central station should feel obliged to engage in a business for which it is not equipped and which is foreign to the business for which it was organized, that of the manufacture and sale of current. There are competent and reliable contractors everywhere who are ready to give their best services at a very reasonable profit. Competition is so keen that the customer need have no fear of being charged an exorbitant price, provided that he does his business with the legitimate contractor.

Bitter charges of price cutting and unfair sales practices have been made by the contractors against the central stations. In New Jersey the contractors went so far as to carry the matter to the courts, and, of course, lost their case. The central stations have a perfect right to do contracting and to sell commodities at any price that they please. It is up to the contractor and the dealer to prove that it is for the best interests of all concerned to let the contractor do the wiring, which is his specialty, and to co-operate in the sale of commodities. It has been argued by the central station that co-operation did not come from the contractor; that retail stores were not operated; that the contractor was not aggressive in securing new business. While this may have been correct at one time, it is hardly true today. The contractor is waking up to the fact that, if he would be in the swim, he must conduct a retail store, and get in close touch with the buying public.

The same lack of co-operation and indifference may be said to have been true of the central station. When the industry was young, the growth was rapid. There then appeared to be a period of apathy, almost antagonism in many cases, which seemed to say "If you want service, you have got to come to us." The business was, and still is, monopolistic, and competitive only with other methods of furnishing service for light, heat and power. There has been a revolution in the policy and attitude of the central station toward the public during the past few years. Note the contrast in the present-day central station whose motto is "Readiness to Serve."

But a few years ago the contractor did not have a line of goods to sell that was particularly attractive to the public. The sale of fixtures, electric fans in their season, and commodities regularly used by the trade were all that he had to offer. The advent of the pocket flash lamp brought increased patronage. It is surprising the number of people that this little article brought into contact with the contractor through his retail store. Today the large variety of heating and other current-consuming devices, which is rapidly increasing, gives the contractor a greater opportunity and incentive to establish a retail trade. The central stations should be convinced that it is for their best interests to co-operate, rather than attempt to control or monopolize the sale of appliances by selling at cost or less. They will be better and more thoroughly advertised and a larger amount sold, if the sales are pushed by several stores, than if sold only by the central station, even at cost prices.

The great obstacle at present, more particularly in the East, to the introduction of heating appliances is, not the price of the article, but the excessive cost of operating. One of the first questions asked by the customer is "How much will it cost to operate?" It is impossible to talk economy of operation of the electric range with a power rate of eight cents, and of the electric flat iron with a lighting rate of eleven cents. We will hope that the time may come soon when the rapidly increasing volume of business will warrant the reduction of rates to a point where the average householder can afford to use electricity for cooking, heating, ventilation and refrigeration, as well as for lighting, and the slogan "Electricity for Everything" may become a fact instead of a theory.

What an enormous field is before us, which can be developed only when rates are established which can compete successfully with gas and other means of cooking and heating. Note the difference in the West where it is not uncommon to find cooking rates of two and one-half and three cents. The day is close at hand when a simple and moderate priced automatic refrigerating plant, designed to be used in the average home, will be placed on the market. The high prices asked for ice during the past season will be an added incentive for the production of such a machine.

Another matter that should be a source of benefit and profit to the central station and the contractor is the co-operation of both with the architect and the prospective builder. The average architect is far behind the times as regards electric wiring. They do not give the wiring problem the attention that it deserves. Usually the light outlets and a few switches are marked on the plans and the specification is a brief instruction to wire to the lights and switches as shown on the plans. The layout is along the lines that would represent conditions five or ten years in the past. The average contractor is ready and willing to lay out any wiring system, draw plans and write specifications. If the architect or owner felt that, by allowing the contractor to do this work, he would be under obligation to give him the work, or that the contractor was "doctoring" the specification so that he would get it anyway, the soliciting would better be done by the commercial department of the central station, who would cooperate with the contractor in laying out the work in a manner consistent with present and future requirements.

Following is the copy of a specification intended to cover the electric light wiring of a better than ordinary dwelling house that was built about two years ago:

"The building shall be thoroughly equipped from the source of supply to each outlet, as marked on the plan, and the wires to be so well protected as to exclude water and gas.

To be knob and Tube system.

To the end of each and every wire may be at all times accessible for inspection and repairs, the location, junctions, elbows, position of switches, etc., and placed in accordance with the rules herein set forth, and the manner indicated on the drawings.

The size of the wires shall be determined on the basis of each lamp.

All tubes shall be of sufficient size to allow the wires to be readily drawn in or replaced at will; no tubes less than ½" inside diameter shall be used.

No staples allowed unless absolutely necessary."

The architect apparently tried to spread himself, but didn't know how. Here is another specification, a marvel of brevity, that has been used by an architect for years, to cover the light wiring in any kind of a building:—

"Wire the building to outlets as marked on the plans or as required by the owner."

When asked by the contractor to be more specific, he stated that he could not afford the time to go into details. Yet this architect is doing a good business and has designed many fine buildings. It is very evident that he considers the wiring of little importance.

The theory of co-operation is a beautiful thing. We find it exemplified in all of the trade journals, and so often is it repeated and preached that co-operation bids fair to become the most overworked word in the English language.

But is not the theory already being applied to practice, and in a practical manner? The Society for Electrical Development was organized for this purpose, and has made wonderful progress during the short time that it has been in existence. The "Sons of Jove," a social organization, is assuming large proportions, and is doing much to promote a better feeling of friendship and goodwill between the manufacturer, jobber, central station and contractor.

Doubtless you are all familiar with the "Declaration of Principles" and "Statement of Policies" of the Electric Development Association. The Declaration of Principles announces that the Association is organized for the purpose of insuring active and consistent co-operation among all the business men associated with the electrical industry in New England. It further states that the electrical industry divides itself into two branches; first—"the manufacturer, sale and erection of current-consuming devices," which branch is covered, of course, by the manufacturer, jobber, and contractor. Second—"the manufacture, distribution and sale of current," which is the business for which the central station was organized. The Statement of Policies is of particular interest to us, as it sets forth, each under a separate heading, the policies which, it says, should be carried out by the four divisions of the electrical industries, namely; manufacturers, central stations, jobbers and wholesale houses, and contractors.

Finally, we should always have in mind the fact that co-operation cannot exist unless all concerned are convinced that they will receive direct benefit and profit; that the fundamental basis and the final object of co-operation in business is the almighty dollar.

CO-OPERATION.

By Francis A. Gallagher, Jr.

What is co-operation? Dictionaries define it is "the assembling of a number of persons for *their common benefit*." The three latter words are especially significant, in that, in them may be found the real reason for the widespread interest manifested in the co-operative movement, not alone in our own industry but throughout the realms of business, and the relation the term bears to the development of our individual interests.

Literally speaking, it is after all but an enlightened selfishness which permeates our system, a feeling kindled in the breast of each of us and fanned into the flame of desire by the belief, that by joining forces with others in the same or kindred line of endeavor an ever increasing productive and distributing efficiency may be attained.

Ours is an age of invention, not alone of mechanical appliances, but of business methods as well. Conditions generally throughout the business world have undergone marked changes during the past few years, until now "efficiency" is the byword the crying need of the day.

What more natural than that the business men of the new school, the men of today, should have recognized the changed business relations between their fellow men, should have been keen enough to grasp the underlying motive of this enlightened selfishness,—the co-operative movement—and to have sounded the death knell of individual segregated conflicting effort.

It is today pretty generally recognized that the growth of our business systems, and this will apply as well to the electrical industry as to any other branch of business, depends largely upon the progress of mutual improvement amongst ourselves.

Each of us—the manufacturers, jobbers, contractors and central station interests have our individual problems to solve, conditions to meet peculiar to no other branch of the industry.

A knowledge of each other's problems is essential if the success of the present movement is to be achieved, for until that knowledge is acquired, the present causes of friction between the various branches cannot be eliminated.

It is only within a comparatively short time, relatively speaking, that the "get-together spirit" has manifested itself in the industry, and because of our former aloofness it has only been natural for each of us, representing the individual branches of the industry, to gather mistaken ideas and to have a prejudiced view of the other man's relation to him. All branches of the industry have been equally at fault. Too often in the past we have all been inclined to expect too much of each other.

Today we all recognize the value of co-operative effort; recognize the fact that co-operation in the fullest meaning of the term, between the various branches of our business, is an actual necessity to all connected with it, if the tremendous opportunities for electrical expansion now before us are to be fully taken advantage of.

There are today fundamental differences of thought, a variation of opinions among the manufacturers, jobbers, contractors and central station interests as to the most efficient methods of co-operating. Opinions differ among the various branches. However our individual opinions in this respect may vary, it is pretty generally conceded the problem we face today is to reach a common working basis through careful planning and mutual compromise.

Close, harmonious relations must be fostered and encouraged by the individual branches of the industry. We, as an industry, have reached a stage of business development where a "community of commercial interests" actually exists between us all—our individual interests are mutual. Anything which advances the interests of one, is of necessity also beneficial to the others.

A start in the right direction has been made, and to all appearances it is the earnest wish of all to see the movement develop to the ideal of its originators.

As the early solution of many of our present misunderstandings and doubts is only possible by an open discussion of the whole problem, from the angle at which we individually see it, it is incumbent upon each interest to present its respective views in all frankness, without venom, to the other branches of the industry.

What should be the position of the manufacturer toward the co-operative movement?

The manufacturer should educate himself as to what devices can be used with profit, both to the central station interests and the user, and should educate himself as to the highest state of the art in their production. Quality should be maintained and costs reduced.

The manufacturers seeking an avenue of distribution for their product, do much by their extensive advertising to create a demand for their creations. They are usually anxious to have all the co-operative effort possible from the other interests to firmly establish their product, the establishment of which should redound to the benefit not alone of the central station but the "Allied Interests" as well.

With them, however, the value of service has been somewhat overshadowed by their effort for production. They have been more anxious to sell than to discourage the sale, although in selling under unfavorable conditions, they do much to discourage the sale of their product for legitimate and really beneficial purposes. Too often they have been only too willing and ready to preach about the advantages of their apparatus, and have seemingly overlooked, to us the more important point, that the user must be taught its limitations.

They have, however, a broader conception of the value of co-operative effort than either of the other two interests with which the central station deals—an appreciation of the fact that, that which is truly co-operative, must be in the final analysis profitable.

How does the jobber fit into the co-operative movement, and what is his position with reference to our industry?

Many look upon the jobber or the so-called middleman as a necessary evil, and a short time since an eminent gentleman in our particular branch of the industry stated that he had not seen any very convincing arguments, any really good and sound statement of the fundamental reasons that exist for the middleman.

Since, however, the middleman does exist, and is today an important factor in our business, what should his position be?

They should endeavor to establish a higher standard of business ethics among the dealers and contractors, and be ready to exert their influence in an effort to correct many of the present abuses existing in the contracting end of the business. Their systems of elaborate credit, to irresponsible "basket contractors," who today are demoralizing the field for the really legitimate contractor, is open to severe censure. It is detrimental and prejudicial, not alone to the jobbers themselves, but to the legitimate contractors and central station interests as well. They would co-operate better with the central-station interests were they to devote their energies to encouraging the contractors to conduct their business along more staple lines, secure more prominent locations, trim their display windows, and carry a well assorted stock of merchandise.

What now should be the position of the contractor?

The contractor "should actively co-operate with the central station interests, in a concerted effort to educate the public in the use of new devices, and in every just and legitimate manner help increase the sale of current and current-consuming devices."

Generally speaking, the contractor is closer to the ultimate consumer than are the central station interests. He has a golden opportunity, when on the job, to suggest the use of and possibly sell many of the ordinary current-consuming devices. So far as I have been able to learn, however, from observation and from the experiences of others, he has not been alive to his opportunities.

The contractor seems to be the one element that either entirely belittles the value of co-operative effort, or has an exceedingly narrow conception of its worth. Perhaps the contractor is not altogether at fault, for in some instances it has been brought about by conditions of our own making.

The contractor must be taught the value of co-operative effort; he must be willing to do his part of the work before us all, the work of "popularizing and educating the great money-spending public, preoccupied, incredulous and indifferent to the advantages of electrical service, so apparent to us all."

He must shake the shackles of indifference which now hold him tightly bound and gagged, and at least endeavor to co-operate whenever the opportunity is presented.

He must learn to appreciate the fact, that his own goods look more valuable and can command higher prices at department stores, because the same articles in his store are cheapened in appearance by indifferent care and display.

There are abuses in his business that are of vital interest to the central-station interests. His is a business that is open to almost any man possessing a little capital, technical skill and ambition. The little fellow—"the basket contractor"—of whom the industry abounds, may never develop into a contractor, but he can and does seriously lower both prices and standards. It is extremely questionable how much real good this so-called contractor does the central station interests. Most of them are irresponsible, financially unsound and unworthy of the support accorded them by the supply dealers.

Our experience in Providence has been, that they can and do cause more bother and hold up more installations in a single month than the legitimate contractors do during the entire year.

Another matter which must soon receive consideration from the contracting interests is that of the standardization of prices for various classes of work. At the present time there is something radically wrong somewhere with their system of doing business. Either the average contractor does not know how to figure, or a few of them believe in making a "killing" on each job.

Here is a case in point. Competitive bids were recently asked for on a motor and light installation in the city of Providence. The bids all covered the same equipment, the work was to be done under certain specifications, and the bids ranged in price from $185 to $464 for the work. The job was finally let for $240.

These two situations, the determination of what constitutes a contractor, and the effort to put prices on a more even plane, must be met in some manner by the contractors themselves, either through their local associations or through the National Electrical Contractors' Association, for both are, at the present time, a detriment and an injustice to the industry as a whole.

How do the central station interests view the co-operative movement among the "Allied Interests?"

We believe thoroughly "in the broad principle of co-operation because it is constructive, productive, and far-reaching in its scope." "We want to see the other fellow prosper, and we want him to keep up with the times, for his own good and for ours."

The problem of the central station interests as they see it today, is a "human problem rather than one of engineering." We are facing the problem of how best to find and develop a latent market for certain commodities which we feel the people want.

We are all keenly interested in creating as rapidly as possible the greatest possible market for all kinds of current-consuming devices.

How should this be done? Should it be left entirely to the activities of the manufacturers, jobbers and contractors on the one hand, the central station interests on the other to the exclusion of the latter two, or should it be developed by all co-ordinating one with another. Needless to say, the latter course is the one preferred by the vast majority of central station interests.

Gentlemen, we of the central station interests among our other activities are today keenly interested in the merchandising problem, largely because we want to fill up our valleys and diversify our load. Incidentally, most of us are interested in securing a profit on the sale of the goods, as is a merchant in any other line of endeavor.

What drew the central station interests into the merchandising field? Much of their present activity is directly traceable to inactivity, lack of faith, and the antiquated policy of the contractors and supply men.

Time and time again, since our advent into the merchandising field, it has been suggested by the latter that the central station interests withdraw from that field, by reason of the fact that we were injuring their legitimate business, it was logically theirs and they were better fitted to handle it.

In justice to the contracting interests, I have made extensive inquiries in the central station industry, and in all frankness, it has been the unanimous opinion of all that were the central station interests to depend entirely upon the activity of the local "Allied Interests," the chances would be sorry indeed for us to increase our earnings to the point they should be.

I called a short time ago upon one of the leading contractors in the city of Providence regarding this co-operative movement among the "Allied Interests." He is one of those who firmly believes the province of any central station company should be limited to the sale of current. He expressed to me a perfect willingness to aggressively push all current-consuming devices, if a living profit were to be allowed him. I inquired what he thought would be fair, and was somewhat amused when he told me, as our company have stood ready for more than a year and a half to sell him on exactly the terms he named, and we are still waiting for the first order.

Now this is no extreme case, and this particular contractor is not a "dead one" by any means, but I do feel that it is typical of the situation confronting the average central station manager.

It has been as a result of these conditions wholly that the central station interests have virtually been driven into the merchandising of current-consuming devices on a larger scale than any local dealers would care to venture.

My friend has a perfect right to think for himself and to value his own opinion, but I have since thought he formed it in this particular instance without due consideration of the facts, and without recognizing his own shortcomings.

The central station interests believe that the public today look to them for a service beyond that of simply furnishing electricity.

That service may be anything from the delivery of a few Mazda lamps, the demonstration or repair of some particular current-consuming device, to free engineering service on a complicated power installation. And the public have been pretty well educated by the department and other mercantile stores as to just what service means to them—the public.

The usual demands upon a central station management to give the service the public insists upon, coupled with the fact that there is little or no real profit to us on the average transaction, even though the article be sold at manufacturer's list to the retail trade, makes it incumbent for a time at least for the central station interests to continue their present policy along existing lines.

A market must always be found for the creations of the manufacturers. They do much by their national advertising to help create a demand, but hard, consistent and persistent local effort is required before it becomes a ready seller.

The financial returns are out of all proportion to the expenditures and would be no inducement to any, other than the central station interests.

Our interests in a way seem to stand apart from those of the manufacturer, jobber and contractor in one particular. The interests of either of these three usually ceases when any current-consuming device has been sold and installed, while with a central station our interest and sometimes our troubles have but just begun. We are compelled to maintain the devices we place on our circuits, do whatever may be necessary to keep them in working order. Under these circumstances, I can hardly see that any but the central station interests are yet in a position to give the service the public demands.

Few central stations but will welcome the day when with the market established and their confidence in the local dealers substantiated by concerted aggressive action and progressive ideas, they can turn this part of their business over to them.

Are the occasional special sales of devices at reduced prices justifiable? The opinion is that they are only a form of leader for further purchases, so extensively, frequently and successfully used by the mercantile interests. To foster the spirit of co-operation, however, the other local "Interests" should be given an opportunity to participate in the sale.

Are we justified today, under present-day conditions, with the market pretty well established, of longer continuing the practice established when the market was tighter than it is today, of either giving away or selling our current-consuming devices below cost? The general answer has been that we are not. The position that the central station interests should take with the other interests on this particular matter was admirably set forth by Mr. C. R. Hayes in his paper read before your body in March, 1912.

The incandescent lamp appears to be one article of a current-consuming nature on which opinions in the industry are somewhat varied. One well-known central station manager expressed himself to me in the following words:—

"There are certain electrical devices and apparatus, particularly incandescent lamps, which the contractor should willingly permit the central station to completely control—with respect to the central station customers both as to price and handling. The lamp must always be controlled by the central stations interests and sold or renewed at prices which will enable them to compete successfully with other forms of illuminant. As a 'burner' it must be kept at the highest point of efficiency in order that high-grade service may be rendered; surely none but the central station is fitted so well to take care of a point so vital to the industry."

Others believe as my friend the contractor, that eventually all apparatus, including lamps, should and will be handled on a broad mercantile scheme of distribution like other commodities, by interests other than the central station.

It could be done—sometime it may be done. Education is the key to the situation—the education of those both within and without the industry.

In general, I believe the central station interests have striven to work with all other branches of the industry for the general good of all. Electric and Luncheon Clubs have been fostered and encouraged, free "juice" has been given as an incentive to brighten up interiors, moving displays have been loaned, free advertising has been offered in return for co-operative effort on appliance sales, educational lectures have been given for their benefit, assistance has been freely extended, our latch string is always out; yet today there are many much mooted questions between the "Allied Interests" as to where the ethical rights of one end and those of the other begin.

A short time ago Mr. Henry L. Doherty made the remark that "the development of the central station business as it now exists in our American cities would have been impossible had dependence been on the jobber and dealer only."

We, as an industry, believe that in co-operation there is a great opportunity for all, and we are trying to approach the matter with the idea of creating a bigger and better market for us all. But if we have co-operation between the various branches of the industry, let us have it whole-hearted and sincere.

Ruthless price cutting, a demoralization of the market and co-operation of brand handed out by some central station companies, two notable Western examples of which are before me, will only prove the ruination of our own game. Central station interests must consider whether it might not injure its own case by reckless pursuance of the at or below cost policy.

Forming a close clique of electrical men itself alone will not bring about the ideal co-operative condition. The public —the purchasing public must be reckoned with, and we as electrical men often fail to give the public credit for its progressiveness. People want electricity, they want to electrify their houses, to lessen hand labor at home and in business, and it is strictly up to us to study the best means of supply and make it easy for them to get electrified.

No set rules and conditions to govern the co-operative movement can be formulated which will apply to all specific cases. It is rather a local question dealing with local situations. We must first convince ourselves that it will pay us and pay us big returns—imbue the spirit in our own organizations—then meet the other fellow at the half-way mark, take the initiative, go meet him.

It is the expressed belief of many that the effort to establish harmonious relations within the industry should be taken up by our National Association, a section established for that purpose, its work to be carried on in much the same manner as the existing Commercial Section.

Without question we are all interested in the co-operative movement for what there is in it; the dollar at the end is what attracts us all. A very brief summary of what the attitude of the central station should be may be found in the following words:—

"Our co-operation should consist primarily in a maintenance of prices which will enable the manufacturer, jobber and retailer to market and distribute electrical products energetically and successfully at a profit—a profit which is not so small as to deprive them of that enthusiasm in the conduct of their business, without which sales will not be pushed to a point where the volume is worth while to all concerned."

THE PRESIDENT. This is a very important and interesting paper, and it is hoped that there will be a full and free discussion. It brings out many different points of view. I will ask Mr. H. E. Page of the Electrical Supply and Equipment Company of Hartford to open the discussion.

MR. PAGE. Mr. President, the various phases of the subject have been so well covered that there seems little to say that is new.

The word "co-operation," for instance, has been termed the overworked horse, driven to death, and ought to be turned out to pasture for a year to recuperate. To my mind, however, co-operation means this—the curbing of our business jealousies. Isn't that the foundation of it? Are we not more or less jealous of one another, and do we not try in one way or another to hog the whole thing, so to speak? The resultant action of co-operation is reciprocity.

I would emphasize, rather than criticise, Mr. Keenan's paper; he made so many good points from the jobber's standpoint.

First:—We will consider the jobber and the contractor.

Contractors condemn without a word that jobber who maintains a construction department. The jobber also condemns the contractor who sells the curb contractor his supplies. The great evil that exists in this practice is the extended credit which the small contractor obtains. He can go to the jobber and run up a bill to the limit of his credit and then he will begin trading with some of the larger contractors and run up a much larger bill with them perhaps, because they may not know his financial responsibility as well, and so he is backed up to the point where he is given a much larger amount of credit than his financial standing would in any way warrant. The effect of this is that it puts him in a position to do cheap work and undermine the standard of work which should be maintained as is covered in Mr. Gilliland's paper.

Second:—The jobber and the manufacturer.

I believe it is the office of the manufacturer to create the demand for his supplies by advertising, by his special agents, and in the various ways by which he can bring them before the public. In return, it is the office of the jobber to supply that demand without substitution.

Third:—The jobber and the central station.

Mr. Keenan's statement that the central station should sell only that which it produces—current—I believe to be absolutely right. I would cite one large central station that is carrying this out in practice, namely—the New York Edison. I recently had a conversation with Mr. Law of the New York Edison Company on this subject. Doubtless, many of you are familiar with the policies of that central station. They have five large stores throughout New York City, well equipped for the display of electrical apparatus, and yet they will not sell anything. They will take an order, but immediately turn it over to the manufacturer of the apparatus, or to his authorized distributor to be filled and billed. There are some exceptions to this policy as in a small town where there is no contractor who is suitably equipped to serve the public; but, where the central station sells material in a small or a large city, I believe it should be at a profit, a merchandising profit which will net a profit to the dealer should he be in a position to sell it.

I believe, as has been said here tonight, that it is far better to have the jobbers and the contractors with their large selling force boosting the central stations and acting as their agents for their appliances than to have them antagonistic to the central station and a disturbing element, causing the central stations more or less trouble in the way of complaints, etc. I would therefore say, let us have the resultant of co-operation—reciprocity. Let us live and let live. Let each in his own sphere of action work as his work gives him that opportunity, that we may all attain that success for which we are all striving.

Mr. Rollins. Webster's definition of the word co-operation is so simple and plain that it should be readily understood by all and no doubt has penetrated the anatomy of all of us. The carrying out and maintaining the practice, however, in a broad way, would bear as yet a great deal of painstaking missionary work.

We are all busy people, devoting practically all of our time in directing our daily affairs and smoothing out the knotty problems that are continually presenting themselves. Central station men are naturally all playing the game for what it is worth, and as Mr. Gilliland states, "The underlying and controlling feature in the final analysis is the mighty dollar."

Those who hold the cards are expected and supposed to play the game to the best advantage; the "penny wise" and "pound foolish" man is the one whom we have to contend with in a proposition of this sort. He is usually a narrow minded knocker, devoting his time and efforts to decrying others who are successful instead of lauding merits that he might acquire should his energies be properly directed. Get-together luncheon clubs materially aid in this work. A good example of this is the Worcester Publicity Association, which was formed in my city within the last year. Every two weeks during the winter months an eminent speaker goes there to talk after luncheon, all for the purpose of advertising and boosting Worcester, creating a friendly feeling between business men and incidentally endeavoring to eliminate the unjust chronic knocker whom it is of interest to us all to remove from within our midst.

One of our speakers remarked, "If you have a chronic knocker in your city buy him out, buy him out at any cost, then kick him out, send him to Canada or some other foreign land where he can eat bean soup the rest of his natural life."

We central station men all court just public criticism which places us in a position to correct any existing wrong that may have been overlooked in our business. The knocker for personal and political aggrandizement is a detriment to the entire community.

It seems to me to acquire the desired results it is up to the central station managers to formulate a plan of co-operation among ourselves. Our relations with the other allied interests are very similar, and it seems to me it would be an easy matter to—

Get together and standardize our co-operative relations;

Establish a merchandising system of appliances;

Submit policies agreed upon to the electrical contractors, jobbers and manufacturers for their approval.

It is frequently put up to us by the contractors in our city that Springfield is more liberal in its treatment of the contractors than Worcester. Providence and other cities do certain things more favorable to the contractors. As previously stated, this looks like a simple matter to us, to have a definite understanding and adopt business policies very similar throughout the entire central station membership of our association. We will then know in a measure what our neighboring city is doing. In Worcester I regret to say there is apparently very little co-operative interest predominating among the allied electrical interests at the present time. The contractors' association, as I understand it, has been practically demoralized, which was brought about by labor troubles of the electrical workers. There seems to exist a strong feeling of antagonism rather than co-operation among the various electrical interests at present.

Personally, I believe a committee of this association, appointed by the President, should take the initiative along these lines and get active at once and draft articles covering the various features from the central station standpoint. It is a matter that would call for very careful study and consideration and no doubt would call for several meetings. The game, however, is worth the candle. I trust action of this sort may be brought about soon, as it will certainly benefit us all. If we cannot boost the allied interests surrounding us we certainly can remain silent, and silence is sometimes golden.

Mr. Sands. Mr. President, I think our Association is deeply indebted to the authors of these four papers. The presentation of this subject from four different standpoints, in as clear, concise and fair a manner as has been done, cannot help but be a benefit to us all.

When I first read through these four papers a question presented itself to my mind: What would a layman think of these papers? At what conclusions would he arrive as to the condition of the electrical industry? And it seemed to me that he might quite properly and with some degree of reason conclude that the electrical industry was going to the cats and dogs, that the individuals engaged in the industry were a lot of pirates, merely waiting for the chance to spring at each other's throats for the sake of the almighty dollar; that he might wonder why it was that we had been unable to apply to our business those principles which have long been recognized as sound in other lines of merchandise, and why we have been unable to place our business upon those bases which do obtain in nearly every well established line of business. This does not appear remarkable to us, however, who know the rapid growth which the industry has had, and who realize the tremendous and ever changing conditions which have accompanied that growth. I do believe, however, that our industry has reached a crisis, a crisis which, however, need not be viewed with alarm but should be viewed with serious and careful consideration. This is a day of specialized effort, and I believe we have reached the time when we have got to begin to specialize along certain definite lines.

In the early 90's I was a resident of the Pacific coast and witnessed some of the mushroom growth of some of the cities which have sprung up there so rapidly, and I think our industry can be likened very much to the condition which obtained among the medical fraternity. A small town would start up and would have one, two, or three regular practitioners. As the population increased we would get one or two specialists, and as the population increased again we would get more specialists. Why? Because the medical fraternity began to realize that both the interests of their own profession and the interests of the public could be best taken care of by specialized effort.

Now the question comes: How are we to go to work to get this specialized effort? and I want to refer to one of the closing sentences in Mr. Stetson's paper this afternoon. He says, in speaking of the manufacturers, the jobbers and the retailers, and I think the central station could well have been included there: "I want them to get together oftener to educate each other more thoroughly and to try and solve each other's problems." I have changed that a little bit. I would say "to try and regard each other's problems." I think perhaps one of the reasons for our present condition is that we have been too prone to solve each other's problems. We have thought we were solving the other fellow's problems, while in the last analysis we were probably solving our own to our own satisfaction.

All of the authors of these papers have stated either directly or by implication that back of this all is the personal interest, the love of the almighty dollar, but if we are ever going to work along broad co-operative lines we have go to be very careful that the one dollar up here, right in front of the eye, does not exclude the hundreds of dollars which are going to come to us later on.

Now just a word or two along the line of regarding each other's problems. Mr. Keenan spoke of the lamp question. I am not going to start anything here, but there are those of us who feel, and feel very strongly, and I think I may safely say that a very large majority of the central station men here feel, that the central station, if it is going to give to its customers that standard of lighting service which it wants to give, must control the lamp situation. I think we will all agree that there are very, very few contractors who in the past few years would have given to the consumer free tungsten lamps in place of those that proved defective to the extent that the central station has, and without that free policy the introduction of the tungsten lamp and the consequent improvement of the service would have been greatly retarded.

Mr. Gilliland in his paper refers to the extremely low rates that obtain in some of our western cities for heating and cooking. Thereby one might gain the idea that Mr. Gilliland intended to imply that we in New England were not up to date. However, when one stops to consider that the major portion of those cities are served either by companies deriving their power from hydro electric developments or in those regions where the price of coal is ridiculously low, you can well understand the reason for these low rates for current.

I believe that we are going to go forward pretty rapidly along co-operative lines. I have too much faith in the sound commonsense of the men engaged in the electrical industry to believe that we are going to close our eyes and deliberately pursue any policy which in the last analysis is going to prove a cut-throat policy. I believe that we are going, as Mr. Keenan has said here, to go along so that we can mark the channels so well along the lines of separate endeavor which rightly and properly belong to these various interests that no manufacturer, jobber or contractor, and I will add the central station, will care to deviate from this course. Thus far, gentlemen, we have all had our fingers in the pie, each trying to get all we possibly could. Now we have got to make an equitable division. Let us each cut our own piece, and then let us sit down and eat it together in peace and harmony.

Mr. Burleigh. Mr. President and Gentlemen: I will discuss these papers simply from the manufacturer's viewpoint, for the reason that I don't feel myself competent or in a position to discuss it from any other point. Previous to starting in on this discussion, however, I do want to call your attention to the numerous references to "current consuming devices" in three of the four papers, which I think might well be "current utilizing devices" instead of "current consuming devices."

I wish to take this opportunity to compliment the author of the paper—this referring to the manufacturer's paper—on the masterly way in which he has handled this subject, and in discussing this paper have nothing but praise to offer it.

On page four the second idea, "to teach the customer how to use electricity more intelligently and economically." It occurs to me that some of the distributing companies may possibly not be as keen as they should be in this respect. This was perhaps most glaringly exemplified on the advent of the tungsten lamp. Of course we all laugh at the fears of the distributing companies now, but we can all look back at the panic preceding its introduction.

On page six, second paragraph, the writer touches lightly on the fact that "The manufacturer is generally the last one of the four main branches of the industry to receive any direct benefit from such a scheme of co-operation." The benefit to the central station is direct if the customer is secured, and at a fixed price which represents to him continuous revenue. But no matter what the expense of the securing of the customer has been to the manufacturer, he must now compete for the business, and his chances of securing it are proportional to the number of manufacturers and his profit or loss, large or small, ends with the transaction. In any event the central station is the one principally benefitted.

On the same page, the fourth paragraph, the writer mentions the architect, which calls to mind a recent conversation with the manager of a western central station discussing co-operation on electrical work, in which he expressed ideas on this subject which might be considered heresy coming from a central station man, but which, possessing more or less merit, I am led to repeat for your careful thought. He stated: "The central station, contractor, jobber and manufacturer all agree that education is the most valuable asset for our business, and each branch of the business pats itself on the back and says if the other three would do nearly as much as I do the desired result would be accomplished." We have each realized the desirability of this education for years, and have labored independently with the end in view of educating those having use for our output with whom we come in contact. The manufacturer comes in contact only with the purchaser of his product, namely, the central station, jobber, contractor, consulting engineer and general manufacturer. The jobber comes in contact with the first four. The contractor comes in contact with all of the above, and in addition comes in contact with the architect, real estate dealer and landlords. The central station comes in contact with all of the foregoing, and in addition with the tenants.

Now let us see who has accomplished the most in this educational field in the last thirty years. You will admit that the manufacturer, jobber, contractor, consulting engineer and central stations are pretty well up to date and alive to the conditions, and a good part of this education you must concede to the manufacturer, for from him emanates the first information with regard to any new device. This is passed along and participated in by the other four, architects, real estate man, landlord and tenant. The contractor and central stations are the only ones who come in contact with them. How does their education compare today with the other classes mentioned, and what would be the benefit derived from their education and enthusiasm? The architect would be benefitted, for his commission would be increased if all buildings were designed for and equipped with current utilizing devices. The real estate man could more readily dispose of property with electric supplies for lighting, heating and power, and the landlord would be benefitted in like manner. The interest they take in these matters today as compared with the interest taken by the other industries named is to a certain extent some measure of the comparative educational effort made by the four divisions of the electrical industries under discussion.

There is no argument with regard to the benefit to the central stations if all new buildings of every name and nature in their territory were wired, nor is there any argument with regard to the benefit to the contractor.

In thinking this situation over I often ask myself, quoting from my friend, if many of us, the central station managers, have done our duty to ourselves to the same extent that the manufacturer and jobbers have, and from which we have benefitted. Referring to the next paragraph on the same page, with regard to electric vehicle education, it occurs to me to ask you who has, with a very few exceptions, done practically all of the educational work in connection with popularizing the electric vehicle. On the top of page seven the writer suggests that "When we shall have succeeded in making men and women as familiar with electrical terms as they are with those pertaining to an automobile, then we shall have advanced a long way to establishing the universal use of electricity." We have had thirty years in which to do this, while the automobile manufacturer has had but about one-third of this time, and our product is no less attractive than his. It occurs to me that one of the strong reasons why we have not is that none of us fully appreciates that we of the electrical fraternity have never adapted ourselves to talk the lay language as relating to our own business. The minute we speak to the layman of watts, volts, amperes, or even horsepower, his mystification begins and he stops trying to understand. We are unable to modify our language, and in my opinion we must teach him our own language without his realizing that he is being taught. I feel that one of the ways that we could make a start in accomplishing this would be to so frame every electrical advertisement issued by the central stations, contractors, jobbers or manufacturers, that some part of it would contain the statement that a watt was the unit of energy, equal to 1/746th of a horsepower, and that a horsepower was equal to 33,000 foot pounds of energy per minute, and the latter was equivalent to raising one pound one foot in a minute. Seeing this everywhere would stimulate the curiosity, followed by interest, exciting inquiry, and promote investigation, which would culminate in results, which is the successful sequence of logical advertising.

That is to say, if some part of every advertisement could have some explanation of those terms, they would finally be drummed into the lay public to the extent that they would not feel so awfully mystified when you begin to talk of volts and amperes and ohms.

MR. JOHN J. MYER. I cannot help but think that young Mr. Burleigh has struck a new live viewpoint in this matter of co-operation by drawing our attention to the fact that the terminology in which we must address the layman is rather unfortunate, and it would have been a great help if Mr. Volt and Mr. Watt and Mr. Ohm could have been Mr. Foot and Mr. Pint or Mr. something else that the layman was entirely familiar with. However, we have got to suffer along with that. We are constantly adding to it ourselves. Every now and then we need a new one, such, for instance, as K.V.A. We are accustomed to talking among ourselves, and when we want to introduce a new expression into our ordinary conversation among ourselves we assume that it is the other fellow's business to acquaint himself with what we mean. I think that is unfortunate. We may get over it some day, but I don't see any prospect of it in the near future.

This question of co-operation, it seems to me, we are right here tonight trying to confine within the ordinary close limits in which we have all been working for years, that is, educating each other about our particular stuff and forgetting all about the man on the street. I don't meet him, of course; I peddle out a few feet of high quality material to very close corporations, like central stations and contractors. I don't get a chance to talk much to or about the fellow who buys juice to light his house with, and unless this co-operative spirit, that we are trying to bring about among ourselves, reaches out and embraces him, why, I don't see that we are doing much good. We can get here and elsewhere in a bunch and co-operate with each other until we get blue in the face, till our knuckles get all calloused, and our knees, too, but unless we get out after the guy that kicks about the 75 cents a month minimum I think we fall down on any co-operative effort. I think that is the boy we are after, and I wish I could help you to get after him more energetically. I don't see how I can. I don't see how this preliminary $200,000 that the Society for Co-operative Electrical Development is trying to raise and has started to raise, is going to be a drop in the bucket. I can use more than that right in Boston, and still I can't get some of the people there to co-operate with me in using my stuff, which is, after all, the basis of all our energies.

Mr. Charles Howes. Mr. President, and members of the New England Section: This call for remarks is entirely unexpected, and I am hardly prepared to say anything on the subject.

There is, however, one idea lurking in the back of my mind, in regard to a closer co-operation between contractors and central station interests.

I have in mind several instances which have been brought to my attention while calling upon contractors where they have a market for motors and devices, and would like to push the sale of them but do not dare to do so.

I may say the reason for their fear is the ever present possibility of the central station going into the wiring business and doing work for cost.

In a number of instances, the commercial manager uses this as a club over the contractor, because he wishes to make a showing for his department, not only in the consumption of current, but also in the motors and devices which he has to sell.

It seems to me that this condition could be very much improved by closer co-operation.

In regard to the central stations supplying lamps at any old price, I think in a measure, they are right, if they would confine their sales strictly to customers on their own lines. There are instances, namely, in medium size cities, where there are nearby towns, lighted from small central stations, whose customers come to the larger city because lamps are cheaper there, neglect their own central station, and are furnished lamps, without being asked who they are, or where they came from. This condition hurts the dealer and central station man in the small town.

Mr. Foster. Mr. President, during the reading of the papers I made a few notes of things that occurred to me, and one at a time each of those notes has been ably discussed, much better than I could do it.

Some ten or fifteen years ago I heard a story regarding three salesmen traveling for electrical supply houses that was quite interesting. The three met at the corner of two streets in Boston one Saturday afternoon about one o'clock. A gentleman who knew all three of them passed by and spoke to them. About half-past four that gentleman returned, and the three were still there talking. He stopped and said, "Gentlemen, is this a long discussion you are having?" Finally it developed among them that none of them were willing to leave for fear the other two would talk about him. I am glad that the electrical industry has advanced to a point where the four prime factors in the industry can get together and talk about each other to their faces and solve some of their difficulties.

The two most talked about people, however, tonight are not here, that is, the illegitimate contractor and the architect who has not time to draw up proper specifications. I am rather glad they are not here, and I hope the time will come when we will not have to contend with those classes.

The four papers to which we listened tonight certainly were able papers, and I think they sufficiently and clearly define the four principal fields of operation in the electrical industry, so that when we go home from here we should know in which field we belong and stick to that field.

The word "co-operation" is an important word with us. When we get home and down to business I hope we won't forget the first syllable of the word.

Mr. Carpenter. Mr. President and Gentlemen: It seems to me that these papers are so thorough and have been discussed so very carefully and thoroughly that there is not much left to be said. The only thought that I had had in reading them over which has not been very carefully discussed is what I touched on in my little talk this morning, that is, about the national advertising. It seems to me that that is a point which we ought to keep before us, to omit all references to kilowatt and K.V.A. and things of that sort, refer to the goods and in simple language create a desire. I think that if instead of calling these "electric current consuming devices" we should call them "electric conveniences," creating a desire on the part of men to have the thing rather than to say that it cost ten cents or fifteen cents or three cents an hour, or anything like that, that should be the basis on which the advertising is carried out. Then it is for the solicitor of each particular company to tell the customer when he goes to see him, "Well, this will cost you so much a week," or so much a year, or something of that sort; but it seems to me that really in most sales the price is practically the last thing the customer wants to know. Of course it is the first question he asks, but it is really the last thing he ought to know.

Mr. Rowell. Mr. President, I should just like to say a word in regard to the papers, but on general co-operation. I just had an instance come to my notice that I think would be very interesting to all you central station men. We were invited to invest some money in a small community in Massachusetts where the central station was in a receiver's hands. We devised a plan of writing a letter to the entire public that was using our commodity, stating what the facts of the case were and what was absolutely necessary in order for us to invest our money. This was followed up with another letter of explanation, and then in the last letter we sent out a statement, just a little card, asking the public if they would sign this card if they wanted us to invest our money and raise their rates 25 per cent. You would naturally expect that all of those cards would go into the waste basket, but the scheme was so well followed up by personal interviews that over 75 per cent of the customers petitioned us to raise their rates 25 per cent. and come in and invest our money.

The President. Any further discussion? If not, we will declare the discussion closed.

I wish to call attention to the fact that tomorrow morning is our last session. The boat for Bluff Point leaves at 1.30 p. m. sharp, so I will ask all members to be here promptly at 10 a. m. tomorrow morning. This session stands adjourned.

(Adjourned till Friday, September 19, at 10 a. m.)

SECOND DAY.

Friday, September 19, 1913.

The convention re-assembled at 10 a. m., President Townsend presiding.

The President. The next paper on our program is "The Relation of the Central Station to its Customers," by J. T.

Shannon of the United Electric Light and Water Company, Waterbury, Conn.

THE RELATION OF THE CENTRAL STATION TO ITS CUSTOMERS.

By J. T. Shannon,

United Electric Light and Water Co., Waterbury, Conn.

This is an age of concentrated effort, having as its ultimate aim "Maximum Efficiency." We have heard efficiency literally preached in every phase of business for the last few years. Electrical manufacturers have concentrated upon the efficiency of apparatus, central stations upon the efficiency of operation, distribution and accounting. We should be glad of all these things, of the wonderful strides that have been made by each, and of the co-operation that exists between the different branches of the electrical business. It would seem that, in so far as the electrical apparatus and central station operation and distribution are concerned, the maximum efficiency is placed before us and we can truly say to its inventors and developers, "Well done, thou good and faithful servants."

I believe that the next twenty years are going to require equally as much brain work and development in the Commercial end of our business as has been required during the past twenty years in the development of the Engineering end. We need an Edison, a Steinmetz and a Tesla of central station commercialism.

Before such great progress can be made in the commercial field, however, the confidence of the public must be won. There is at the present time too much misunderstanding of our business. Here, I would like to be permitted to relate a story. I was reared on a small farm in Tennessee, and every night after supper, we kids would slip over to the cabin of our old black Mammy, and sit in front of the big fire while she would tell us ghost stories—about the haunted house on the hill—the big ball of fire that would roll across the road to frighten horses—and the skeleton in the cedar chest upstairs. She believed these stories, and each one told was accepted as true. In some she was an actual participant. She would tell a real scarey one just before it was time for us to go back to the big house. Then she would say, "Well, it's time you all were in bed and asleep. So run along home, chillun." Now, can you imagine three scared children going home in the dark after listening to ghost stories? Not much. She, or one of her boys, would have to escort us all the way home and safely deliver us to Mother and Father. I was quite a big boy before I ceased to believe in these ghost stories. Some grown-ups today have their various superstitions. Superstition, unbelief and distrust are forms of ignorance and it is only by a continual process of education that this weakness in humanity can be overcome.

Like unto the ghost stories of the old black Mammy is the word "Electricity" to the ordinary layman. He thinks of it as a great mystery. He has heard of its killing people, and such a thing as using it would be out of the question. The electric meter placed in his cellar is looked upon as an instrument to pick his pockets. He associates its cost with radium, gold, diamonds and pearls.

Is there any wonder that there is strife and misunderstanding between so many central stations and their customers? You do not understand your customer and your customer does not understand you. Did you ever try to explain something to a Hungarian or an Italian, who did not speak English? If you have ever had this experience, you will appreciate my comparison. Not much progress was made, was there? NO, SIR. He did not speak your language and you were not understood. Oh, how much we are misunderstood in this great industry of Electric Service to the public.

The object of this paper is to point out what seems to the writer to be some of the causes of misunderstanding, and suggest certain things that may be done to promote better feeling.

The first and most persistent cause of trouble and misunderstanding is the type of employee some central stations tolerate. A large per cent of the trouble of any Public Service Corporation is caused by the indifference, insolence, or desire to be "Smart" of some irresponsible employee, who really has no business in such an organization.

Before you can have a 100 point service to the public, you must first concentrate upon the selection of the employee for the job, from office boy to general manager. The man should fit the job and the job fit the man. How many central stations employ ignorant, careless, slovenly-dressed meter readers? In serving 5,000 customers, 5,000 meters are read each month by this class of men, meaning 5,000 bad impressions upon the minds of your customers. The trouble man, inspector, collector, cashier and clerk deserve careful selection.

A good clear complexion cannot be obtained by the use of cosmetics. The trouble is internal—not external. So before you can impress the public and your customer that you are really trying to please and properly serve them, it is necessary to get right on the inside before they will accept this fact. We have all seen the beautiful exterior of the large commodious quarters of some central station offices, and then stepped inside and been greeted by an atmosphere of indifference. Do you remember the impression that was made on your mind? Did you walk around the town and note the poorly lighted stores and abundance of gas arcs? Did you hear what Mr. Merchant said when you mentioned the lighting company's name? It confirmed your impression, didn't it? And so it is. Get right on the inside before you try to throw a big front and exterior to the public, otherwise they will surely see through the paint.

It is an old saying that "If you expect your children to display good table manners when they go away, you must begin at home." So there is the key—begin at home, right in your own organization. After you have selected the proper type of employees, you must educate them. Let them know that you have their interests at heart—that they are not mere cogs in a wheel of a machine, but are human beings, that they are a part of the company, and its success is largely dependent upon their industry, and its good name upon their conduct. Teach them to always be courteous in their attitude toward each other and to exercise the Golden Rule in their dealings. Speak to them as gentlemen—treat them as gentlemen, and after a while they will find out they are gentlemen and will leave a gentlemanly impression upon the minds of the public.

If you are situated so that you can do so, inaugurate a Welfare Department for employees—a room or two equipped as a library and rest room. This gives the employees a chance to meet and talk things over—a kind of daily get-together meeting of the employees themselves. This will be a means to holding your organization together. Have a talk given them by the General Manager on general company policy, and by heads of various departments relative to the various phases of the work. It will inspire them to learn more and be better employees.

If a central station is large enough to support such things, a school for the education of employees is a fine investment and will earn large returns. If you cannot conduct a regular school, occasional lectures will do much to stimulate interest. A yearly dinner, or an annual picnic, will do much to keep your organization with you. The Public Policy Committee of the National Electric Light Association has made many suggestions for carrying out welfare work, such as sick benefits, service annuities, profit sharing, etc. Every central station should put such welfare work into effect just as soon as their financial condition will permit. Once these schemes are firmly established, the employee will take more interest in his work, and be a better public servant.

A standing prize offer for suggestions by employees in the improvement of the company's service is a valuable asset with the employee and with the company. The money can be awarded according to the value of the suggestion, this question to be decided by a committee of heads of departments. In addition, a separate prize for specific results is a good thing. I know of one particular case where a prize of $5 was offered for the employee outside of the New Business Department turning in leads developing the most new business, and one hundred new customers resulted. These things get the spirit of organization rather than the letter, and that's what we want, school and college spirit.

Let it be firmly impressed on your mind that your organization is everything. You may have beautiful theories of the proper treatment of the public, but you actually come in contact with but few customers. The customer may know nothing of your beautiful theories, but a lot about the insolent attitude of some collector or "trouble shooter." If you find that in spite of proper treatment, some members of your organization will not fall into line, will not adopt modern ideas of commercialism, are not actuated by a desire to please the customer, there is but one thing to do—get them out of the way and get someone in who will go about their work with the proper spirit.

You should not allow an employee who is out of sympathy with your ideas to stay in your organization any longer than the bees allow a drone to stay in the hive. Have good live wires with modern ideas or none at all. Every wide awake employee who does his work well will leave that impression on the mind of customers, and elevate every employee of the company, as well as himself, in the eyes of the public.

Courtesy and prompt attention to the public by every employee is the key-note and first essential requirement for maintaining proper relations with the public. In how many central station offices are customers kept waiting to pay their bills, while some clerk finishes footing up a column of figures? How often is the cashier instructed to consider it his most important duty to see that customers are promptly attended to, and that each customer is cheerfully greeted, and a polite "thank you" given with each receipt. A small matter you may think, and something that the manager, who is too often absorbed in some engineering problem, has no time to think about. But it is little things like these that make or mar our relations with the consumers.

What about your telephone operator? Is she prompt, pleasant, and accommodating? The question of answering the telephone may again seem like a very small matter to an engineer, but please remember that an impatient, ill-tempered telephone operator will do much to create a feeling of discontent with your service and your treatment of the public. When you receive a complaint that your customer's lights are out, is it attended to promptly and cheerfully, or does the customer have to call up two or three times before someone goes down and replaces a fuse? And next day, do you have the telephone operator call up all customers who complained the previous day, and in this way find out if their complaint was satisfactorily taken care of? This does not take much time, or cost anything to speak of, but it gives the customer the impression of true "Readiness-to-serve." Yet how many central stations take this much trouble to create this impression?

What about your whole system of following complaints? Is every complaint followed in a systematic manner with a written record of every step; and with someone whose business it is to watch and see that it is finally and properly disposed of? If it is not followed up in this way in your city, you can be sure you have found one of the causes for discontent. If you receive a complaint of poor voltage, do you at once install a curve tracing voltmeter, and submit such records to the customer to prove to him that his service is first-class? If you receive a complaint on a high bill, do you install a curve tracing ammeter, and show the customer just how much current he was using during each hour of the twenty-four, and how the record so obtained checks up with the reading on his wattmeter?

Too many central stations do not take the trouble to try to satisfy their customers in these matters, but merely consider all complaints as kicks of some crank, and yet they wonder why they have trouble with the public. Please remember that the great mass of people are honest and are trying to do what is right. You will seldom receive a complaint unless the customer truly thinks he has good grounds for complaining, and it is certainly up to you to investigate and settle every complaint received.

Marshall Field built up a wonderful business on the motto "The customer is always right." Several of the immense mail order houses have built up their business and mammoth profits on the motto "Satisfaction or Money Refunded." Selling electricity is fundamentally the same as selling anything else, but did you ever hear of a central station with either of the above mottoes? Has not the motto of too many of them been "Pay the bill or we'll take your meter out?"

I fully realize that it is usually considered rank heresy to propose that in some cases it is best to ignore the reading of the meter and settle a bill on a basis that is satisfactory to the customer. Of course this could not become a regular practice, nor could it be done very often for any particular customer. Too many central stations have made it an iron-clad rule never to make such adjustments. There are cases where it seems advisable, and the only satisfactory thing to do.

If other lines of profitable business can be built up on the motto "Satisfaction or money refunded," then why can't the central station occasionally practice this policy? If one of your iron-clad rules is to stick to the meter reading under all conditions, try some time to settle a bill on the basis of satisfaction or money refunded. You may be surprised because the skies do not fall, but you will find that you have made a friend of that customer, and ninety-nine times out of a hundred, he will never again ask or expect such a concession.

What is your policy in the matter of credits? Do you demand a deposit from every customer? After a customer has once made a $5 or $10 deposit, do you keep it until he dies, or moves out of town? When you do finally return it to him or his heirs, do you pay interest on it, or merely return the principal? Of course we all appreciate that it is necessary to ask for a deposit from some customers, but surely a large percent may be given service without any deposit. It costs but little to pay the legal rate of interest on all deposits asked for, and instead of waiting for a customer to make a demand for such interests pay it promptly the first of each year, by putting it as a credit on his January bill. After a customer has been on your books for one or two years, and has always paid his bills promptly, return his deposit.

Does your company take an active interest in everything that will help develop and boost your territory? Do you do what you can to make life pleasanter in the community you serve? If there is to be a band concert or a skating contest, or any kind of a celebration, does your company furnish the lighting free of expense? It doesn't cost very much and it makes many friends.

These are only a few suggestions for improving our relations with the public. Every central station man who will give a little thought to the matter can think of many other ways. When any central station manager becomes fully alive to the fact that he is a public servant in the true sense of the word, and introduces a little of the Golden Rule into the conduct of his daily work, the feeling of the public towards his company will be one of the least of his worries.

THE PRESIDENT. I will call on Mr. H. T. Sands, Malden Electric Company, to open the discussion on this paper.

MR. SANDS. Mr. President and Gentlemen: It seems to me that a discussion of Mr. Shannon's paper could be summed up in the one word "Amen." I think he has stated very clearly the importance of the little things. It is a lesson which we have all been learning, more particularly in the more recent years, that it takes more than a good office, it takes more than a well-dressed manager, with a good automobile to ride round town in, to make good with the public. Every employee must contribute his full share toward the work of any central station service, regardless of his position, if we are to fully fulfill our duties as public servants.

There are one or two things that Mr. Shannon spoke of that I would like to mention. One is the matter of making an adjustment in the meter bill. There are times when I believe it is good policy and good business to make an adjustment in a meter bill, but I think we must be very careful to make the customer understand that that adjustment is made merely to satisfy him and not because it is his due, and I have found that there are very few people, when it comes down to brass tacks, that want that kind of an adjustment. I have in mind one case that was brought to my attention a few years ago, of a large department store. Evidently some of the clerks had been negligent and had left some of the lights burning in some of the furniture display rooms, and he was very indignant at the amount of his bill. I did everything I could to satisfy him that the bill was correct. We installed a check meter in with the other meter, and they registered almost identically, the difference being only the drop in the other meter. Finally, I said to him, "Now, look here, you think you ought to have $50, and I value your business enough to give you $50, but I am giving it to you merely as a gift. The current has been used. We have delivered the current to this meter. Beyond that meter we have absolutely no control whatever; some of your employees have used it. If you want me to give you $50, and if you will feel better if I do, I am very glad to do it, because we value your business. He said, "No, no, Sands, I don't want it."

Another thing, Mr. Shannon refers to our iron-clad rules. That word "rule" is something that I tell our employees they must forget. If there is anything that makes a customer hot under the collar it is to say, "Well, that is our rule." In the eyes of the customer the central station corporation is an impersonal thing. He is viewing it from the standpoint of the individual employee with whom he happens to be in contact at that one time, and if there is anything that leaves a bad impression it is to have a man go into the office and be confronted with this statement: "Well, that is our rule, and we cannot deviate from it."

I like the emphasis Mr. Shannon placed upon the meter readers. In our own offices we used to think that a boy at $5, $6, or $7 a week was good enough for a meter reader. Now we believe that a $18, $20 or $25 a week man is none too good. No one of our employees has the chance, as Mr.

Shannon has pointed out, to create a good impression with the public that our meter readers have. No employee comes so frequently in contact with the public as your meter reader. To my mind we want to get the best men we can for those positions.

MR. MOSES. The reference to welfare work in Mr. Shannon's paper is the cause for my taking up a little of your time, thinking that possibly you may be interested in the activity of the Boston company during the past year in promoting the general welfare of its employees. We rarely pick up a magazine today but what we find some reference to welfare work. Ideal schemes for service annuities, sick benefit plans, etc., are all explained in great detail, but up to the present time, at least, it has been my experience, that no facts and figures have been available, upon which the companies can get some idea of the cost of such a system for themselves. If I may have a few minutes I would like to give you the figures that we have collected during the twelve months closing on the thirtieth of June this year. It seems to me that this whole question of education of the customer of the present day resolves itself into three parts. First, I think it is undeniably true, and has been recognized, that we have the goods; second, that the public desires to buy them, and third, the only thing left for us to do is to make the public feel that they can afford to buy them. This is undoubtedly a process of education. It has been aptly pointed out in the paper that this education must begin in our own organization. Constantly decreasing rates are made possible to a certain degree by increased efficiency, and continuity of employee's service contributes not a small part to accomplish this end.

Following very closely upon the report of the Public Policy Committee of the National Electric Light Association regarding welfare work, the Edison Company spent about six months in field work and began operation on July 1st, 1912, forming a separate bureau within the company to take care of this work. The personnel of the bureau at the present time consists of a superintendent, a librarian, a medical director, a chief clerk, an inspector for outside work and a stenographer.

One of the first things we started was the employment office. From many points of view it seemed desirable for us to choose the very highest grade and type of employees that was available. This employment office was opened on February 1st, of this year, and during the five months to July 1st 1,566 applicants had been interviewed. The primary idea of the employment office is to give everybody applying for work with the company an equal opportunity of getting it, and relieving the department heads of the annoyance and time occupied in interviewing the great number of applicants that are bound to come into your office looking for jobs.

We found that it was necessary, in order to secure the highest possible grade of men for our work, and in view of the annuity plans and sick benefit plans, that we must have employees who were physically sound and fit to work, and this has made it necessary as one of the qualifications that every applicant should pass a medical examination very similar to the examination required by the life insurance companies. I think the results on this line have justified themselves that a medical examination is necessary, because during the period referred to 497 people have been examined, 435 accepted and 62 rejected, which runs a little more than 10 per cent, and that percentage is still being maintained. About 10 per cent of all applicants examined are rejected, which means a saving to the company later on in sick benefits, death benefits and the like.

We have made a very careful analysis of the number of people on our payroll during the fiscal year ending June 30, with the idea of seeing what the continuity of service really was, so as to have something to compare the service with next year and see how our plans were being accepted by the employees and whether or not the stability of service was being increased. During the year 837 employees left the company. During this same time 1,086 new men were added. Of those 837 who left the employ of the company we find that 472 resigned and 365 were discharged. This has been carried down to a much finer classification, but I think it is of little value here. It is this 472 who resigned that we hope to materially reduce, and thereby indirectly increase the efficiency of our whole organization.

On February 1st of this year the company put in force well defined rules and regulations regarding disablement and death benefits, which are classified into three classes: first, industrial accident benefits; second, sick benefits; third, death benefits. The industrial accident benefits permit the employee to get full wages during the time of his disability by injury on duty. This disregards—I won't say disregards—this is more liberal than the terms of the working men's compensation act, in that the act only provides for half the average weekly wages of the employee not to exceed $10 a week, and under the company's rules we make up the difference, so that last year 98 per cent of our men who were injured when off duty received full pay during their disability, the other two per cent received not less than three quarters pay.

On sick benefits the employee is taken care of from the disability payroll for one-quarter of the number of weeks that he has been with the company. Everybody participates, even the man that has only been with us one month. If he has been there a month he is entitled to a week's sick benefit; if he has been there a year, three months; if he has been there ten years, two years and a half, and so on, which makes it automatic for the long term employee to receive the greatest benefits, as should be the case. Full wages are paid for thirteen weeks, three-quarter wages for the next thirteen weeks, one-half wages for the next seventy-eight weeks, and one-quarter wages for the next three hundred and ninety-six weeks. We feel that a man who comes into the one-quarter class is really to be regarded as permanently disabled, and that his weekly wage should be approximately what it would be if he was on the pension list.

The death benefits are payable to everybody who dies while in service from any natural cause or injury off duty, and while not large they have been well received where paid. They consist of paying twenty-six weeks wages amounting to not more than $500 or not less than $100, payable either in a lump sum or in weekly payments as may seem best.

Under the compensation act the benefits paid during the year amount to $4,201.38, which includes payments for two deaths, $350 in one case and $2,700 in the other; the amount paid out by the company for sick benefits for five months was $2,534.97, and for nine deaths in nine months, the death benefits amounted to $2,917.50, or total benefits of $9,653.85.

On May 1, 1913, the service annuity plan was put in force, which is very similar to the service annuity plans of other companies. A man retires at the age of sixty-five after fifteen years of service, a female at the age of sixty, after fifteen years of service, receiving one per cent of their average salary for the past ten years preceding the time of retirement, multiplied by the number of years in service. On May 1 five men were retired, and their annuities amount to $2,100 a year.

The medical division has formed a very important part of the work during the five months it has been established. During this period 878 patients have been seen and 1,343 calls have been made, showing, I think, the readiness with which the employees avail themselves of free medical attention. 1,707 days lost time have been paid for on account of illness for which the company has expended $2,295.78 in wages.

Analysis of the accidents the company has had has formed a very important part of the work of the year. You may be surprised to know that we have recorded 720 accidents during the twelve months. That seems a very large total, due principally to the fact that the company insists on having accidents of even the very minutest nature reported, looked up, the cause investigated, complete reports made. These 720 accidents are divided into what we may class as the general public and the employees. There were 270 accidents in the general public class, of which 9 were fatal and 261 non-fatal. Among the employees there were 450 accidents, 2 of which were fatal, 448 non-fatal. The apparently large number of accidents in the classification of the general public is accounted for by the fact that it is the Edison Company's policy to let out a very large amount of its construction work, and all but 93 of the 270 accidents were incurred by employees of sub-contractors doing Edison Company work. Of the 448 company accidents in 343 cases there was no time lost, which emphasizes what I referred to previously, that we insist on complete reports of even minor accidents. The remaining 105 accidents caused a loss of time of 1,387 days. The maximum time lost was 187 days, and for all those 1,387 days no employee received less than three-quarters of his regular weekly wage.

An analysis was made to determine what might be called the peak of the accidents that we had, that is to say, we analyzed the time and the days on which the accidents occurred by dividing the day into four parts. We find that on Monday afternoons, between twelve o'clock at noon and six o'clock at night, we get the maximum number of accidents, which seems to be in accord with what other statisticians on this subject have found.

We have been particularly interested in savings and loan funds. While the company has no regularly established department along this line, we give our moral support to the Industrial Credit Union of Boston and have encouraged 204 employees to join this union. They have invested on July 1 $2,885, representing 577 shares. These 204 people, or a portion of them, have borrowed from the union $3,077.

We find on a study of the situation, however, that some men find the demand upon their pay is such that in spite of economical living they cannot even afford to begin to save. We find them heavily encumbered with loan sharks and credit houses of all natures. This led the company to feel that these type of men should be protected and helped, so on March 15 the company set aside the sum of $1,500 for experimenting in lending to employees without interest and without security. Any employee on presentation of the facts to the welfare bureau may borrow up to $100, the maximum amount outstanding at any one time not to exceed $1,500. Up to July 1 of this year 44 loans had been made, amounting to

$1,860, ten had been repaid in full, leaving 34 outstanding, to the amount of $1,113.50.

In addition to the above, the company has an accident prevention committee, the personnel of which are men amply qualified to fill their duties and pass upon the nature of accidents, one coming from each big department. They meet weekly, review the accidents for the week, and make recommendations which will tend to prevent the recurrence of such an accident.

The company has continued through the year to publish its monthly paper, Edison Light. We began last fall issuing as supplements to Edison Light the papers written by Dr. Doty, the medical director for the American Telephone and Telegraph Co., on the subject of hygiene.

In the latter part of June we held the second annual field day, practically making it an Edison holiday, closing all the offices and keeping only a sufficient number of men in the generating stations to keep the system running. This was held at the Riverside recreation grounds. About 4,500 employees and their families and their friends attended, and all sorts of sports were enjoyed during the day. Prizes were awarded to the amount of about $400. An ample lunch was served, and I think everyone had a good time. The cost to the company for the field day was approximately $5,100.

We have been making investigations on the subject of co-operative buying and some modifications of plans of district nursing, with the idea of getting into the employees homes and recommending changes there which might make for their better health. We have a very complete equipment of pulmotors, at sub-stations and other centres of distribution, and also a well equipped first aid cabinet, providing for emergency.

But the most decided step in establishing welfare work on a permanent basis in our company has just taken form in breaking ground at our new plant on Massachusetts avenue for a group of three buildings to be known as the welfare group, the total cost of which will be somewhere about $150,000. These buildings are to be put up on three sides of a square, one to be a combination restaurant and assembly hall, seating about 400 people when used as a restaurant and about 600 when used as an auditorium. The second building is the recreation building, with locker rooms, gymnasium, bowling alleys, pool, billiards and the like. The third is to be a library, where those studiously inclined may enjoy the quiet. Probably in the library we shall have some few rooms to accommodate those whose late hours make it necessary for them to stay in Boston over night. Between the buildings there will be laid out three tennis courts. Immediately in front of the buildings, in a large depressed area, will be a skating rink for the winter, immediately in back of the buildings a ball field for next season.

The total expense of the welfare department for the year to which I have referred has been approximately $30,000. The question naturally arises in one's mind, does it pay? because our experience shows that next year we are going to spend probably $50,000. We have hardly been going long enough to collect sufficient data on which to base a concrete opinion, but I can say that all of our efforts have been well received by the employees. The increasing work of the medical director, who devotes all his time to our interests, is encouraging. We note less absences from sickness, and what absences we do have are of shorter duration. We have noted that the injuries, while not less in number, are less serious in their nature, and that the period of convalescence has been much shortened. And we have noticed particularly that the grade of the new employee has been raised considerably. It is the men with families who are looking for permanent employment that now come to us, and this must be due to the news which is spreading about that it is particularly desirable to get a position with our company at the present time.

Let me emphasize the fact in closing that the company pays for all of this. There are no contributions asked or expected from the employees. We have derived very much pleasure from carrying on the work during the last year, but we don't assume the attitude of paternalism over our employees, or do not profess to be unusually philanthropic.

Mr. Ingalls. Mr. President and members, I think that after the able paper by Mr. Shannon and the remarks of the speakers preceding me there is very little for me to say.

I think that one thing we will realize in our relations with the customers, where there are a considerable number of employees in the company, is that owing to the fact that each employee has his own specific duties rather than general duties, as they do in the smaller companies, their lack of information in regard to what the rest of the fellow employees in the company are doing, the nature of their work, etc., makes it particularly difficult for them when questioned by the customers in regard to something that comes outside of their jurisdiction to give a satisfactory answer to the customer. It is very embarrassing for a meter tester or meter reader to be asked questions about incandescent lamps or transformers, line extensions, and other subjects with which he is not familiar. The customer thinks that he ought to have all the information at his fingers' tips and give it to him offhand. One thing upon which I insist with those employees that come under my jurisdiction is that if they are not able to give the customer information they must not try to bluff through but tell him nothing but facts. If he is unable to give the customer the information, why, he must say so, and report back to the office and we try to inform the proper department, that the customer may get what he is looking for.

In regard to meter readers and other employees that are uniformed there is one difficulty, and that is that uniform of blue cloth is very difficult to keep in a cleanly condition, particularly with meter readers who have to visit all kinds of places from the cellars to the attics. Sometimes I have thought that it is a good deal better to give them simply a uniform cap and a badge, rather than try to put them in complete blue uniform. A uniform is very essential in some cases, because it gives the employee ready access to the premises and makes it much easier to do his work.

Mr. Fred H. Smith. Mr. President, Gentlemen: There is one phase of the paper which has not been dwelt on at all, but to my mind is of considerable importance in your relations with the customer, and that is the manner in which you lay out your main office. How often do you go into an office and the first thing you run up against is a high counter and a big glass front or some beautiful grill work that is all right for a bank, instead of having your office wide open where the customer may see what is going on. Any man that is going to register a kick hates to go up to one of these little holes in a glass window or the bars of a prison and undertake to tell you his troubles. And another thing, your private office. As the customer comes in and wants to get at the head of the company he will go to the clerk at the counter and say, "I would like to see Mr. So and So." "Well, he is in his private office. I don't think you can see him now." The man may have a just complaint, or think he has anyway, and such an answer gets him hot under the collar, because he cannot get at the man that he wants to talk to. To my mind, have your office wide open, so that when a man comes in and he has some complaint to make, and your clerk at the counter can't take care of it, your own desk is near enough to the counter so you can keep general run of what is being said, and if you find that the clerk is getting into hot water you can get right up and go at it yourself. That is the way we do in our office, and we find that it works out very well. Another thing, it keeps the standard of your office help up, because the boss himself is right there on the job, in plain sight, and they have got to be on to their job all the time or perhaps get a call down. It is a mighty fine thing to have a private office; sometimes I wish I had one, especially if I have been out the night before, where I could go in and sleep. But one of the things that a good many of the central station officers are up against is not having the manager's desk accessible to the customer.

The President. Gentlemen, is there any further discussion on this paper? If not, I will ask Mr. Shannon if he has anything further to say.

Mr. J. T. Shannon. Mr. President and Gentlemen: I wish to thank Mr. Sands, Mr. Smith and Mr. Moses for adding to the remarks I have made, and I am sure that what they have said has been appreciated. The only point that I want to leave in your minds is—do not forget your customer and the Public, for they are standing willing and ready to accept real true "readiness to serve" if offered in the proper spirit.

The President. I wish to announce, gentlemen, that Mr. Keyes of the Boston Edison Company has extended a very cordial invitation to all the members to visit their new laboratory, which is one of the finest in the country.

The next paper is "Lamp Voltage and Socket Voltage," by Henry Schroeder, General Electric Company, Harrison, New Jersey.

SOCKET VOLTAGE VS. LAMP VOLTAGE.

By Henry Schroeder,

General Elec. Co., Harrison, N. J.

Mr. Chairman and Gentlemen: I have some charts here I would like to tack up to illustrate my talk.

This paper is short, but I have a few remarks to make afterwards to bring out some other points.

An incandescent lamp in itself has no voltage; it is simply a dead resistance. The so-called voltage of a lamp is the voltage that should be applied to give the proper efficiency, life and candle-power determined by careful investigation when considering the renewal cost of the lamp and the cost of energy.

Simply because a lamp is rated at a certain efficiency by the manufacturer, it is often assumed that this rating would hold, regardless of conditions under which the lamp is operated. The rated efficiency, candle-power, watts, life, etc., can be obtained only when the socket voltage is the same as that of the voltage label on the lamp.

Efficiency is expressed in "watts per candle," which term is often confusing, for the reason that the higher the efficiency of a lamp the lower the watts per candle. Increasing the efficiency of a lamp of given quality decreases the life, and as the total cost of lighting is the cost of lamp renewals, plus the cost of energy, of which the lamp renewal cost is but a small part, it is therefore important to operate lamps properly in order to obtain light at a minimum cost. By doing it benefits all concerned: the consumer, the central station, and the manufacturer.

To the consumer it means that he gets more for his money. For example: a 100-watt Mazda lamp operated 4 volts low, means that he is losing 11½ candle power, but saving 5-4/5 watts. In order to get the full amount of light that he is entitled to in a 100-watt lamp, he would have to burn a 15-watt Mazda lamp in addition, and the slight saving in the cost of lamp renewals does not offset the extra energy cost of the 15-watt lamp. This situation might be compared to the steam engine or electric motor, either of which is rated at the horse-power capacity at which it will give its maximum efficiency. It is apparent that this would not be economical to order a 25 H. P. motor if a 10 H. P. motor was required, as it would be better from a first cost standpoint, as well as from the standpoint of the energy consumed per horse power delivered, to order a motor of more nearly the desired capacity, even though the larger capacity motor would have a longer life when operated below its rating.

To the central station it means that as the customer in the above case undoubtedly would not burn a 15-watt lamp in addition to the 100-watt lamp, there is a loss of nearly 6% load that could be obtained if the lamp were operated properly, and the customer is not getting the light he is entitled to.

When tungsten filament lamps were first introduced, it was the general practice to add a few volts to the circuit voltage in specifying lamp voltage. This was due, perhaps, to lack of confidence in the lamp, to compensate for breakage and early burn-outs, by obtaining long burning of the remaining lamps. The tremendously improved quality of the present drawn-wire Mazda lamp and the very conservative rating given by the manufacturer, makes this practice absolutely undesirable and one which should be looked into and done away with. It should be remembered that long life of a lamp is not a criterion of its quality, unless the efficiency at which it is actually burning is known to be what it ought to be.

An investigation covering many central stations has shown that it is the actual, though perhaps unconscious practice, to operate lamps from two to five volts below the rated voltage on the label. If central station managers realized that Mazda lamps are now giving lives well in advance of their rating, and that for every extra volt on the circuit, 1½% extra revenue can be obtained, this practice would not continue, so that it would seem that they are only limited in raising the voltage to the convenience of renewals by their customers. At a 10 cent current rate, 100-watt Mazda lamps would be most economically operated at six volts above their labeled voltage, even when lamps are paid for at list prices, and the frequency of renewals would be about as often as would be with carbon lamps if they were renewed when they had depreciated to 80%.

On account of the opportunity to increase the revenue and to give better lighting service to the customer, a careful investigation of the customers' socket voltage conditions is well warranted. It is not infrequently found that the station voltmeter reads two to four volts high, and as the voltage drop on the lines is generally not measured, these two together with the drop from the service switch to the customers' sockets should be frequently tested. With the usual growth in load each year it will be found that the drop in voltage is much greater than supposed.

In order to further this subject the Edison lamp works has investigated a number of central station circuits, offering the use of men with voltmeters to go round and test the voltage and look into the general conditions. I have a report here similar to those that we get out which might be of interest to you.

Object of Voltage Investigation.

There is a very important and intimate relation between lamp voltage and profit to a central station. Therefore, it is very important that incandescent lamps be operated at the proper voltage. The object of this investigation was to determine the exact voltage conditions at the lamp sockets in Spotless Town, N. Y.

An incandescent lamp gives its rated life, candle-power and wattage only when operated at its rated voltage. For instance, a Mazda lamp labeled 113 volts consumes 100 watts when operated at 113 volts. If this lamp was operated at 109 volts, it would consume only 94% watts. This loss of revenue, resulting from operating the lamps under voltage, is shown in the attached blue-print.

We give a blue print with the report. This is the actual report that we give to the central stations after the voltage survey has been made.

It is recommended that all lamps be operated at a high operating efficiency. Inasmuch as the rated life of Mazda lamps is a conservative figure, it is no longer necessary or desirable to play safe when ordering lamps. In fact, such practice will result in decreased revenue to the central station and loss of light to the consumer.

Method of Investigation.

The voltage readings were in all cases taken at the lamp socket, since the socket voltage alone governs the performance of the lamp. In order that the resulting data show average conditions, considerable care was exercised in locating the places where readings were taken.

All readings were taken in the evening, during the lighting hours, since it is only the voltage at that time which affects the performance of the lamps. The readings in this particular case cover a period from 7 P. M. to 9 P. M.

The station voltmeters were calibrated and the results are shown on the attached sheet.

And we have a sheet attached, a blank filled out showing the various voltage readings.

Readings were occasionally taken at the service switch in order to determine the average interior drop.

Method of Determining the Proper Voltage of Lamps to Use.

It is realized that a slight variation in voltage with time and distance will exist on the lines of every central station. Unless this variation in voltage is extreme, it is recommended that lamps of one voltage be used on the entire system. The problem which confronts every central station is to determine upon one voltage of lamp which will give the best results under the conditions as they exist.

It is recommended under conditions as they exist on the lines of the average central station, that the average of the voltage readings taken to be used as the basis for determining the voltage of the lamp to use, provided the variation from the maximum readings and this average does not exceed five volts. Should the difference between the maximum readings and the average result be more than five volts, the average voltage that would be recommended would be raised until this difference would be just five volts.

Voltage Conditions Found in Spotless Town.

A summary of the readings which were taken is shown on the attached data sheet. It will be noted that these readings vary from a maximum of 116 to a minimum of 108 volts, the average being 112 volts. Since 115 volt lamps are now being used, it is evident that they are operating on an average of three volts undervoltage, resulting in a loss of approximately 5% in revenue and 10% in candle-power.

Method of Eliminating This Loss of Revenue.

Since this loss in revenue is caused by undervoltage burning, it can be stopped by eliminating this undervoltage burning. This can be done by any one of the three following procedures:

1. By decreasing the voltage drop on the line.
2. By using lower voltage lamps.
3. By increasing the station voltage.

1. Decreasing the voltage drop means the installation of more copper and larger transformers. Of course, it is generally advisable to decrease the amount of the line loss, but for the purpose of eliminating undervoltage burning less expensive methods may be pursued.

2. The use of lamps of a lower rated voltage will in time eliminate the undervoltage burning. The loss in revenue will not be completely stopped, however, until all of the higher voltage lamps now on the lines have been replaced by those of lower voltage. Inasmuch as the higher voltage lamps now on the lines will live somewhat longer than their normal rated life, it is evident that the stoppage of the revenue loss in this case will be somewhat low.

3. Raising the station voltage is the quickest and surest way of stopping losses in revenue due to undervoltage burning. If the station voltage rather than the lamp voltage is changed there will be no resultant confusion, since as far as the customer is concerned, there will be no changes to make.

Recommendations for Spotless Town.

Since the investigation shows that the lamps are now being operated on an average of three volts undervoltage, it is recommended that the station voltage be increased three volts, increasing the average socket voltage from 112 to 115 volts which will then correspond to the lamp volts. By doing this it is possible to immediately stop the present loss in revenue, and at the same time materially improve your service.

Another point I would like to bring out is in the renewal of lamps. It is perhaps not appreciated that wattage of a lamp decreases during its life. In the case of a 60-watt Mazda lamp at the end of about 1,100 hours life when the candlepower reaches 80% the wattage has declined to 95%. The customer is actually obtaining only 80% of his initial candlepower, and at the same time the central station suffers a decrease of 5% in income. This decrease continues the longer the lamp burns. From this it will be seen that it is an advantage for the central station to encourage the removal of discolored lamps; it will be compensated by an increase of revenue when the same are replaced by new lamps, and at the same time the customer will obtain more light and a lower cost per candle power. It has been figured out technically in several ways what the theoretical smashing point of a lamp is, but it is interesting to note that in all these studies it comes out exactly at our rated life at high efficiency of 1,000 hours.

I have also been asked to say a little something about the new developments in Mazda lamps, particularly of the nitrogen filled lamp. The principle in a nitrogen filled Mazda lamp is quite simple. The use of nitrogen has one disadvantage and two advantages. The disadvantage is that it cools the filament. In the vacuum type of Mazda lamp the filament keeps hot on the same principle that hot water is kept warm in a vacuum bottle.

The first advantage is that the vaporizing point of the filament is considerably raised. It is for the same reason that water in a steam boiler at a pressure of 150 pounds to the square inch will boil at approximately 300 degrees Fahrenheit instead of 212. In vacuum, water will boil at considerably below 212 degrees Fahrenheit. The idea is to put a slight pressure on the filament to keep it from evaporating. By so doing we can raise the temperature of the filament to a higher degree before it begins to evaporate quickly and blacken the bulb.

The other advantage is that, on account of the heat of the filament the gas circulates, rising to the top of the bulb. That means that all the blackening is going to be up near the neck of the bulb, and the lower part of the bulb will be kept clear.

In order to keep down the loss from conduction on account of the cooling effect of the gas inside the lamp it is necessary to make a very short and thick filament. That means a filament of high amperes, five amperes or more, in order to get good efficiency. A gas filled lamp below five amperes will probably be no better than the present Mazda lamps, which have been considerably improved by the use of chemicals in the lamp, which prevent blackening.

We find that probably 15 to 20 amperes is the lowest amperes at which we can operate a lamp in order to get a half a watt a candle. So development is being made of lamps of 20 amperes for street lighting use of approximately 500 watts and 1,000 watts, using current transformers with each lamp to step up the 4, 6.6 or 7½ amperes A.C. series circuits to 20 amperes.

We are also developing regular Mazda street series lamps of 60 candle-power and above 5½ amperes, with nitrogen gas. We can probably make these lamps of a little higher efficiency than we can our regular street series line of lamps of the present manufacture.

We are also developing 750- and 1,000-watt, 110 volt nitrogen filled Mazda lamps. And I should like to point out the fact that the present types 25-, 40- and 60-watt Mazda lamps cannot be made with nitrogen to improve their efficiency on account of the cooling effect of the gas.

MR. PRINCE. Mr. President and Gentlemen: It seems to me that this proposition should be approached from one angle that Mr. Schroeder did not mention, and that is the question of the ultimate free renewals of Tungsten lamps by the central station. The public has been used to the free renewal of the carbon and then the Gem lamp, and will ultimately demand, and does demand, the free renewal of the Tungsten lamp and such free renewals tend to strengthen the central station's control of the lamp situation which we believe is desirable for the best interests of the public. Therefore, the problem for the central station is to justify your free renewals of Tungsten lamps by operating them at such efficiency that they will earn you the same current rate as your carbon lamps or Gem lamps do. In Hartford we are operating at voltages below the rated voltage of the lamp, or efficiencies worse, if you wish to call it that, than the manufacturer's high efficiency rating. For instance, in the bread and butter lamps, 25, 40 and 60, we are operating at 1.22 watts per candle where the manufacturer at his high rating suggests 1.17 for the 25 and 40 and 1.12 for the 60. We consider that this is necessary, as we are in a transition period of changing people over from the Gem lamp to the Mazda lamp. Consequently, I don't think the question of whether the man gets the rated candle power at high efficiency enters into it at all, for the reason that any tungsten lamp that you give him of equal wattage will give him so much additional candle power that you have not got to argue at all.

Here are the averages of twenty residential customers that we changed completely over. They used to have 634 watts on their Gem installation, giving 309 candle power. We changed them over to Mazda 640 watts, giving 459 candle power. In the first case, with the Gem lamps, the customer got free renewals on the sized Gem that he was using and paid his $2.40 a month bill. When we changed him over to Mazdas he got free renewals on some and paid for some of the lower wattage lamps, so that his bill was $2.16 and his renewals of small lamps were 40 cents bringing him to $2.56 a month, an increase of sixteen cents. If we had put the Mazda lamps in, at the manufacturer's high efficiency, his bill would have been $2.25 and assuming that we could still afford to give him the same low renewal prices (free for 60 watt and above), his renewals would have cost him 85 cents for these same periods, making his total bill $3.10, and it is not likely that he would have been pleased to have been raised from $2.40 to $3.10. Therefore it seems better business for us to use the lower efficiency lamp. The way we calculated the proper efficiency, for instance, for the 60 watt lamp, was this: A 60 watt Mazda lamp will give us 1,700 hours at 1.22 W.P.C. Now, taking the 60 watt Gem run for 1,700 hours, at the current cost in Hartford of nine cents per kilowatt hour, and deducting the free renewal, that lamp nets us an earning power of 8.53 cents per kilowatt hour, so our problem was to equal that figure with the Mazda. The 60 watt Mazda, operated at an efficiency to run 1,700 hours, deducting the necessary lamp renewal, nets us 8.55 cents per kilowatt hour, practically the same figures. If that lamp were operated at the manufacturer's high efficiency rating, deducting lamp renewals it would only net us 8.25 cents per kilowatt hour during its life.

The tendency to increase their illumination and consequently their current utilization by the public under the stimulus of free renewals, is shown by the following facts. Previous to April 1st we only renewed the 250, 400 and 500 watt lamps free; since April 1st we have gone down to the 60, as I stated. Previous to April 1st we were installing per week, an average of 121, 25 watt lamps against 48 60 watt lamps. That is nearly three 25 watt lamps to every 60 watt lamp installed. Since April 1st, under the free renewal proposition, we are installing 91 25 watts and 169 60 watts, in other words, nearly twice as many in favor of the high wattage lamp. Therefore, you can see how our income is being kept up and our load increased under the stimulus of free renewals and the public is being educated to a higher standard and intensity of illumination.

Now as to how our operation of lamps affect our renewals per socket per year I can read you a few figures. During the year 1910, in the 40 watt lamp, we renewed one and one-half lamps per socket or 150% of the lamps installed, in the 60 watt lamp, one lamp per socket, and in the 100 watt lamp one-quarter of a lamp per socket. In 1911, the 40 watt lamp, 1.15 lamps per socket; the 60 watt lamp, three-quarters of a lamp per socket; and the 100 watt lamp, one-third of a lamp per socket. This year, for the half of the year, figured out to June 30th,—the 40 watt lamp, .44 of a lamp per socket; and the 60 watt lamp, .36 of a lamp per socket; and the 100 watt lamp one-quarter of a lamp per socket. So that we are making a constant improvement in our renewals as shown by these figures.

We also feel that we are very glad to get the reduction in Mazda lamps that the manufacturer makes occasionally, but the next time it happens we hope that he will get the prices of the frosted and clear lamps the same, if possible, as we think he is differentiating in favor of poor lighting. We are making our sales price and renewal price, on all sizes of the clear and frosted the same. Of course, our renewal price on the 60 watt and above is nothing, because it is free.

MR. KEYES. Mr. President and Gentlemen: From the standpoint of the photometric laboratory I should say that such tests as I have made have tended to bear out the contention that the manufacturer is a little bit conservative in rating his lamps. At the same time there is no doubt that if there is to be any difference between the voltage at which the lamp is operated and the labeled voltage, it would be well to make that difference so that the lamp would be operated at a little higher voltage than it is labeled, because such tests as I have made of the life of the lamps would indicate that the lamps were good for it and that they would stand a little higher voltage with a good life. I have just had occasion to make some tests on some series lamps, where I operated lamps rated at 6.6 amperes at 6.7 amperes, and I got 1,000 hours' life with only 10% drop in the candle power.

MR. SCHROEDER. In answer to Mr. Prince, whose problem of changing over Carbon and Gem lamp customers on a meter basis to Mazda lamps with the intention of giving them more light for the same income, he evidently considers it advisable that under these circumstances the Mazda lamp had better be operated under-voltage, in order not to give the customer too much light, as they might cut down the use of some lamps if they obtained too much light, thereby reducing the revenue. This, perhaps, is a good practice to adopt under such circumstances, but as soon as the customers become educated to the use of more light it will be well warranted to use lamps of the circuit voltage, so that customers can obtain the full benefit of the economy of the Mazda lamp.

It has always been the custom to make a slight charge to cover the cost of frosting lamps; if the price of clear and frosted lamps were made the same, there would have to be added to the cost of clear lamps a part of the frosting charge.

The President. Gentlemen, we will have the reports of the Auditing and Nominating Committees and the election of officers this evening, for the reason that our attendance here is small and to-night we will all be together.

Mr. Rowell. Mr. President, I notice that the Burlington press has given considerable of its space to the doings of our meeting, and I feel that our Secretary should be instructed to convey to them our appreciation of the space and time that they have given to the proceedings of this convention. I make that a motion.

(The motion was adopted.)

The President. Is there any further business? I want to call your attention to the photograph that is to be taken in front of the Hotel Vermont immediately after this session. The photographer will be ready, and it will only take a few minutes. We would like to have as large a crowd as possible.

I declare this session closed.

CONVENTION BANQUET.

In the afternoon the members of the Section visited Bluff Point by steamer and dined at the Hotel Champlain. As the dinner was served everyone rose and drank "To the health of our guests, long life of our Section and prosperity of our members."

In opening the after dinner proceedings President Townsend said:

Ladies and Gentlemen, we have an extensive program, and as our time is limited it is necessary to get right down to business.

We expected to have with us tonight Mr. J. M. Wakeman, manager of the Society for Electrical Development. I have a telegram from him to read.

"Tell Townsend I am stopped by wreck. Cannot get through in time to speak at dinner. Cancel room reservations.

J. M. WAKEMAN."

I want to express my appreciation and thanks to our officers, Executive Committee and members of the various committees for their help in making this convention the most successful we have ever had. Our total registration is somewhat over 300. We have 254 present at this banquet. I think that this attendance speaks very well for our New England Section when we can get so many of our members up here in this section of New England, so far away from the larger centres.

Next on the program is the report of the Auditing Committee.

MR. GIDNEY. I beg to report for the Auditing Committee that the Treasurer's report has been audited and found correct.

THE PRESIDENT. The report of our Nominating Committee.

REPORT OF NOMINATING COMMITTEE.

MR. SANDS. Mr. President, Members and Guests of the Association: Before making the report of your Committee I want to exercise one of the prerogatives which may belong to one of the "has wasers" and make a few preliminary remarks.

Our Fifth Annual convention is about drawing to a close, and this convention, like everyone which has preceded it, is the best we have ever had. The subject matter of the papers which have been presented, the excellent manner in which they have been prepared, and the discussions which they have evoked, show that the program has been alive with topics which are of vital interest to our New England central station managers and employees. I wonder to what extent we realize the careful thought and preparation that is necessary to make these conventions the successes that they have been. I wonder how many of us realize the careful, earnest, persistent effort, the really hard work that is being given freely to the work of this Association by those upon whom devolves the conduct of the affairs of the Section. I am not speaking now of the work of our Secretary. The work which she does is too well known and too well appreciated to need discussion here. She is fortunate enough, however, to draw a salary, which she earns several times over. (Voices "Raise it," and applause.) I am referring to the time, experience and oftentimes money that is freely given by the officers of this Section with no other compensation than the consciousness that they are contributing their part toward the upbuilding of the electrical industry in New England.

This is an age of specialized organization. No business expects the office boy to advance at one step from office boy to president. He must travel the road by which he can familiarize himself with all the details of the business before he can expect to arrive at that office. And the same is true of the affairs of this Section. The man who is to fill the office of president, to fill it acceptably to the Section and to the interests which it represents, must have the training which goes with the experience and the judgment that are gained by service in the work of Executive Committee. That committee is in reality a training school for the presidency. The man who comes into the membership of the Executive Committee with the idea that it is all a joke, very soon finds out his mistake. His viewpoint at the first may be limited by the needs of the state which he represents, but he soon learns that there are much larger interests which he must recognize and consider. And by the same token the man who becomes President of the Section, and by virtue of his office becomes a member of the Executive Committee of the National body, finds a still wider horizon opened to him. He finds problems presented which he must consider, not only in the light of the needs of his own section but in the larger interests of the industry as a whole.

It is with this idea in mind that your committee begs to submit its recommendations for the nominations for officers for the ensuing year, and they are as follows:

For President, C. C. Wells of Middlebury, Vt.

For Vice-President, L. D. Gibbs of Boston, Mass.

For Treasurer, R. W. Rollins of Worcester, Mass.

For Members of the Executive Committee: H. B. Ivers, representing Maine; L. J. Chase, representing New Hampshire; A. B. Marsden, representing Vermont; E. P. Rowell, representing Massachusetts; E. A. Barrows, representing Rhode Island; B. H. Gardner, representing Connecticut.

Mr. Holmes. Mr. President, I make a motion that the Treasurer be authorized to cast one ballot for the ticket as nominated.

(The motion was seconded by several members and was adopted unanimously. The ballot was taken, and the nominees of the committee were declared the officers of the Association for the ensuing year.)

The President. Ladies and Gentlemen: I wish to present to you the President-elect, C. C. Wells of Middlebury, Vt. (Prolonged applause.)

President-Elect Wells. Mr. President and Gentlemen: I want to thank you for the election to the Presidency of the New England Section. I am not saying more as we are limited for time.

The President. Next on our program is the Secretary of the National Electric Light Association. He needs no further introduction. He has attended, I think, nearly every convention that our New England Section has held. He will speak to us tonight on "Am I my Brother's Keeper?" (Applause.)

Mr. T. C. Martin. This is a pleasurable time, Mr. President-elect.

On behalf of the National Electric Light Association, representing here President McCall, at his desire and request I convey to you heartiest congratulations upon the prosperity, success and spirit of this splendid organization. I am also desired by President Van Deusen Rickert of the Pennsylvania Association to convey to you equally his heartiest congratulations and to express his regret that the overlapping of conventions prevents his being here. That overlapping should not occur, and it is trusted will not occur again, and that arrangement will enable presidents of sister bodies like this to exchange hospitalities and be present with each other.

My toast is, Am I my Brother's Keeper? The hour is late. The big speaker is to come before us. I shall be very glad indeed to express practically the sentiment of my toast, if any gentleman will call upon me to assist him to the boat. (Laughter and applause.)

The President. The next on our program was an address by Mr. T. I. Jones, Chairman of the Executive Committee, Commercial Section of the National Electric Light Association. I am sorry to say that probably Mr. Jones is held up on the same train that Mr. Wakeman is. There has been a freight wreck I understand on the Delaware & Hudson Railroad, and that no trains have been through into this section since six o'clock this morning. I will call on Mr. Gibbs.

Mr. L. D. Gibbs. Mr. President, last year we had a very successful luncheon club which ran the greater part of the year. A good many have asked since if anything of the kind was going to be undertaken again. There has been a great deal of talk, in fact, the key-note of this convention has been co-operation,—as it was very ably interpreted last night, "getting acquainted with each other's troubles." Some two months ago a movement was started by our Executive Committee to make it possible for us to get acquainted with each other's troubles. The difficulty with most of these undertakings has been that they have always cost somebody quite a little money. We have started a plan now that we hope is not going to cost anybody anything that he does not get back from it immediately, and the benefits of which will continue indefinitely as long as each individual wishes to work. A committee was selected by our Executive Committee to take charge of this getting acquainted with each other's troubles. The idea is to have meetings—get-together meetings—perhaps once a month, perhaps once in two weeks, in Boston or in some nearby place, under the supervision and primarily under the management of representatives of the manufacturers, contractors and jobbers, but with the help of the central stations. It will be a chance for the jobbers, manufacturers and contractors to do the real boosting co-operative work that they have always said they wanted to do. That committee will consist of C. D. Williams of the Simplex Electric Heating Company, H. B. Gilmore of the Western Electric Company, George C. Ewing of the Westinghouse Electric and Manufacturing Company, D. G. Brokaw of the General Electric Company, F. S. Price of the Pettingell-Andrews Company, V. C. Bruce Wetmore of the Wetmore Savage Company, J. P. Coghlin of the Coghlin Electric Company of Worcester, H. E. Page of the Electric Supply and Equipment Company of Hartford, J. G. Gilliland of the New England Engineering Company, Waterbury, Conn., James A. Rogers of the H. B. Rust Company, Providence, R. I., H. G. Lendrim of the Rhode Island Electric Equipment Company of Providence, R. I., together with James B. Andrew, formerly of the Boston Elevated, now with the Boston Edison Company, chairman; Howard T. Sands, Welles E. Holmes, E. R. Davenport and J. A. Hunnewell. This committee is to take charge of and develop a get-together co-operative movement that is going to mean something in getting acquainted with each other's troubles, and at the first meeting, which will be called by the chairman of that committee at no very distant date, we shall expect to see present every man who is in this room to-night, together with his friends in the business whom he wants to help get acquainted with the others who will gather there.

The President. Has anyone any motion to make? I understand that Mr. Peterson has a motion to make.

Mr. Wm. Peterson. I move that we give a vote of thanks to the various committees that have had anything to do with making this meeting a success.

(The motion was seconded and was adopted unanimously.)

The President. The speaker of the evening, Rev. Dr. Gabriel R. Maguire. You can read what we have said about Dr. Maguire on the program. But I wish to say that he was the first man up the Congo after Stanley came down, and you will also remember that our ex-President Roosevelt hunted big game in Africa, but Mr. Maguire preceded him. Mr. Maguire is an Irishman, and this is one case where the Irish beat the Dutch. Rev. Gabriel R. Maguire.

(Rev. Dr. Maguire then lectured on his experiences in darkest Africa, illustrating his descriptions with war-like and peaceful articles of native manufacture and use which he had brought home with him, and thoroughly interesting his big audience.)

The President. I declare the Fifth Annual convention of this Association closed.

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